REPORT RESUMES

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OCCUPATIONAL EDUCATION BEYOND THE HIGH SCHOOL IN OKLAHOMA, AN ANALYTICAL STUDY WITH RECOMMENDATIONS FOR A STATEWIDE SYSTEM FOR MANPOWER DEVELOPMENT.

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MAJOR FINDINGS AND RECOMMENDATIONS OF A STATEWIDE STUDY OF EDUCATIONAL SERVICES FOR YOUTH AND ADULTS WHO HAVE LEFT HIGH SCHOOL AND NEED OCCUPATIONAL EDUCATION AND SUGGESTIONS FOR A MANPOWER DEVELOPMENT SYSTEM ARE PRESENTED. INFORMATION WAS DERIVED FROM AVAILABLE DATA, CONFERENCES WITH INDUSTRY AND GOVERNMENT PERSONNEL, STUDENT QUESTIONNAIRES, AND A GRADUATE FOLLOWUP STUDY. SOME OF THE MAJOR FINDINGS WERE--(1) THE STATE HAS, IN EFFECT, A TWO-LEVEL SYSTEM OF EDUCATION, HIGH SCHOOL AND COLLEGE, WHILE THE OCCUPATIONAL STRUCTURE REQUIRES PERSONS WITH AN INTERMEDIATE LEVEL OF EDUCATION, (2) MAJOR POPULATION AREAS DO NOT HAVE ADEQUATE TECHNICAL EDUCATION SERVICES, (3) THE STATE IS NOT KEEPING PACE WITH THE NATIONAL MOVEMENT TOWARD OCCUPATIONAL EDUCATION BEYOND HIGH SCHOOL, (4) SCHOOLS ARE NOT PRODUCING THE KINDS AND NUMBERS OF TECHNICAL PERSONNEL NEEDED TO MEET THE FUTURE STATE MANPOWER REQUIREMENTS, (5) OKLAHOMA INDUSTRIES ARE NOT EMPLOYING AVAILABLE GRADUATES OF OKLAHOMA TECHNICAL SCHOOLS, AND (6) BUSINESS, OFFICE, DISTRIBUTIVE, AND PARAMEDICAL PROGRAMS AT THE ASSOCIATE DEGREE LEVEL HAVE NOT BEEN DEVELOPED. PRIORITY NEEDS IN DEVELOPING A STATE SYSTEM OF OCCUPATIONAL EDUCATION WERE--STATEWIDE PLANNING, SEPARATE FUNDING, VERTICAL STRUCTURE OF OCCUPATIONAL EDUCATION, AND A SYSTEM OF MANPOWER DEVELOPMENT, TO INCLUDE MANPOWER RESEARCH, INDUSTRIAL PLANNING SERVICES, AND OCCUPATIONAL EDUCATION. TRENDS IN OCCUPATIONAL EDUCATION, THE PRESENT OCCUPATIONAL SYSTEM AND OCCUPATIONAL PROGRAMS, COSTS AND RETURNS OF TECHNICAL EDUCATION, GRADUATE MOBILITY, EMPLOYMENT PATTERNS, AND THOSE BEST SERVED BY OCCUPATIONAL EDUCATION BEYOND HIGH SCHOOL ARE DISCUSSED. A BIBLIOGRAPHY AND RESEARCH INFORMATION ARE INCLUDED. (MM)

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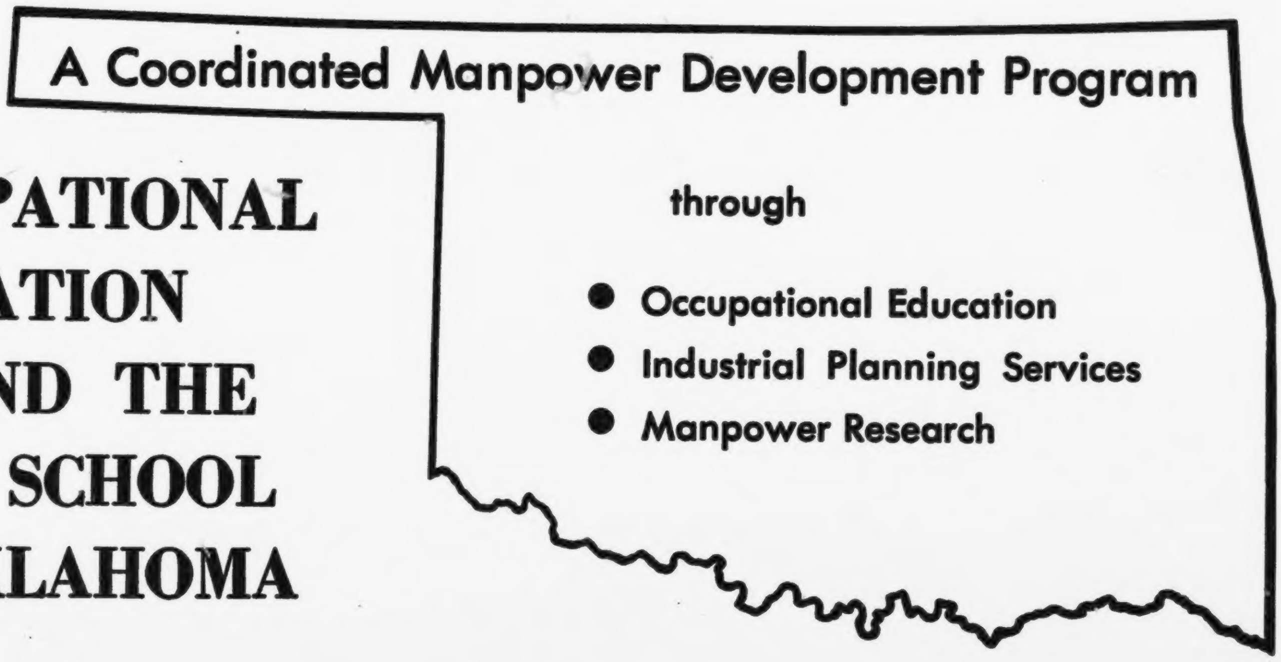

A Coordinated Manpower Development Program

through

- Occupational Education
- Industrial Planning Services
- Manpower Research

OCCUPATIONAL EDUCATION BEYOND THE HIGH SCHOOL IN OKLAHOMA

An Analytical Study with Recommendations for
a Statewide System for Manpower Development
January 1968

By Maurice W. Roney
and
Paul V. Braden

Oklahoma State University

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OFFICE OF EDUCATION

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OCCUPATIONAL EDUCATION

BEYOND THE HIGH SCHOOL IN OKLAHOMA

An Analytical Study with Recommendations for a Statewide System for Manpower Development

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Stillwater, Oklahoma

and

Center for Economic Development--State of Oklahoma
Norman, Oklahoma

January 15, 1968

This technical assistance study was accomplished by professional consultants under contract with the Economic Development Administration. The statements, findings, conclusions, recommendations, and other data in this report are solely those of the contractor and do not necessarily reflect the views of the Economic Development Administration.

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A study of this scope could not materialize without the cooperation and assistance of many organizations and individuals. While it is not feasible at this time to give due credit to all of those educational institutions, business firms, and government agencies (federal, state, and local) that contributed to this study, special mention should be given to the following: The administrators and faculties of schools that supplied much of the basic data used in this report, the research staff of the Oklahoma State Regents for Higher Education, the Oklahoma City and Tulsa Chambers of Commerce, selected Oklahoma employers of technical personnel, the Research Coordinating Unit and the Manpower Research and Training Center at Oklahoma State University, the Oklahoma State Department for Vocational-Technical Education, the Employment Security Commission, and the Industrial Development and Parks Department.

R. L. Sandmeyer and Larkin B. Warner, economists with the department of Economics, Oklahoma State University, were associate investigators on this research project. Their development of a system for analyzing employment patterns for technicians in Oklahoma contributed much to this study.

Five doctoral dissertations in their preliminary stages were very helpful: Harry Nowka's "An Analysis of Post-High School Vocational Business Education Programs in Oklahoma," Wilfred Bates' "An Analysis of Factors Influencing the Technician's Initial Job Selection with Implications Toward Improved Recruitment Practices," Gordon E. Von Stroh's (University of Oklahoma) "A Socio-Economic Study of Vocational-Technical Education Students," Donald S. Phillips' "Personal and Social Background Characteristics of Entering Technician Education Students at Four Post-High School Institutions," and Cecil W. Dugger's "An Analysis of School-Industry Practices in the Placement and Employment of Post-High School Technician Education Graduates." The latter two are staff members in the School of Industrial Education at Oklahoma State University and were very helpful with their comments concerning technical education in Oklahoma.

The following manpower research fellows from the Manpower Research and Training Center, established in 1966 at Oklahoma State University, contributed significantly to this study through their many hours of assistance and the preliminary findings of their graduate research: Robert Dupree, "A Cost-Benefit Study of Post-High School Technical Education in Oklahoma"; Howard Hardt, "The Supply and Demand for Technical Training in Oklahoma"; Robert Freed, "The Development of Technical-Vocational Programs in Oklahoma"; David Anderson, "The Use of Programmed

Evaluation and Review Technique in Coordinating Interdisciplinary Manpower Research in a University Setting--A Descriptive Study."

A research project cannot be brought to manuscript form without the services of the clerical staff. Thanks go to Gladys Faber, Barbara Rice, Connie Johnston, Susan W. Nusz, and Nancy Anderson.

FOREWORD

Changes in the occupational structure ultimately result in changes in the educational system. One of these changes is the emergence of middle level technical occupations which require education beyond the high school but not necessarily to the level of a baccalaureate degree. Another change is the population shift from rural to urban areas which creates a need for training and retraining of adults in the job skills required for industry.

This statewide study obtained information on the state's educational services for youth and adults who have left the high school and need occupational education. The central purpose of this study was to assist state officials of Oklahoma in planning and developing a statewide occupational education system as an integral part of a planned manpower development program.

This report includes the major findings and recommendations of the statewide study, a statement of priority needs in the development of a state system of occupational education, and suggestions for a manpower development system. Data supporting the findings are presented in the body of the study. It is sincerely hoped that the information and suggestions in this and other study reports will be useful in shaping Oklahoma's manpower policy.

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MAJOR FINDINGS OF THE STATEWIDE STUDY

1. Oklahoma has, in effect, a two-level system of education--high school and college. The Occupational structure requires persons with an intermediate level of education.

Oklahoma does not have a comprehensive system of intermediate level education beyond the high school. Two-thirds of Oklahoma's school-age youth complete high school. Twenty per cent graduate from college. Less than 2 per cent complete any kind of post-high school occupational education program. Technical occupations requiring specialized education and training at the associate degree level constitute 6 per cent of Oklahoma's work force at the present time. It is estimated that 25 per cent of the jobs in the occupational structure of the future will require training at this level.

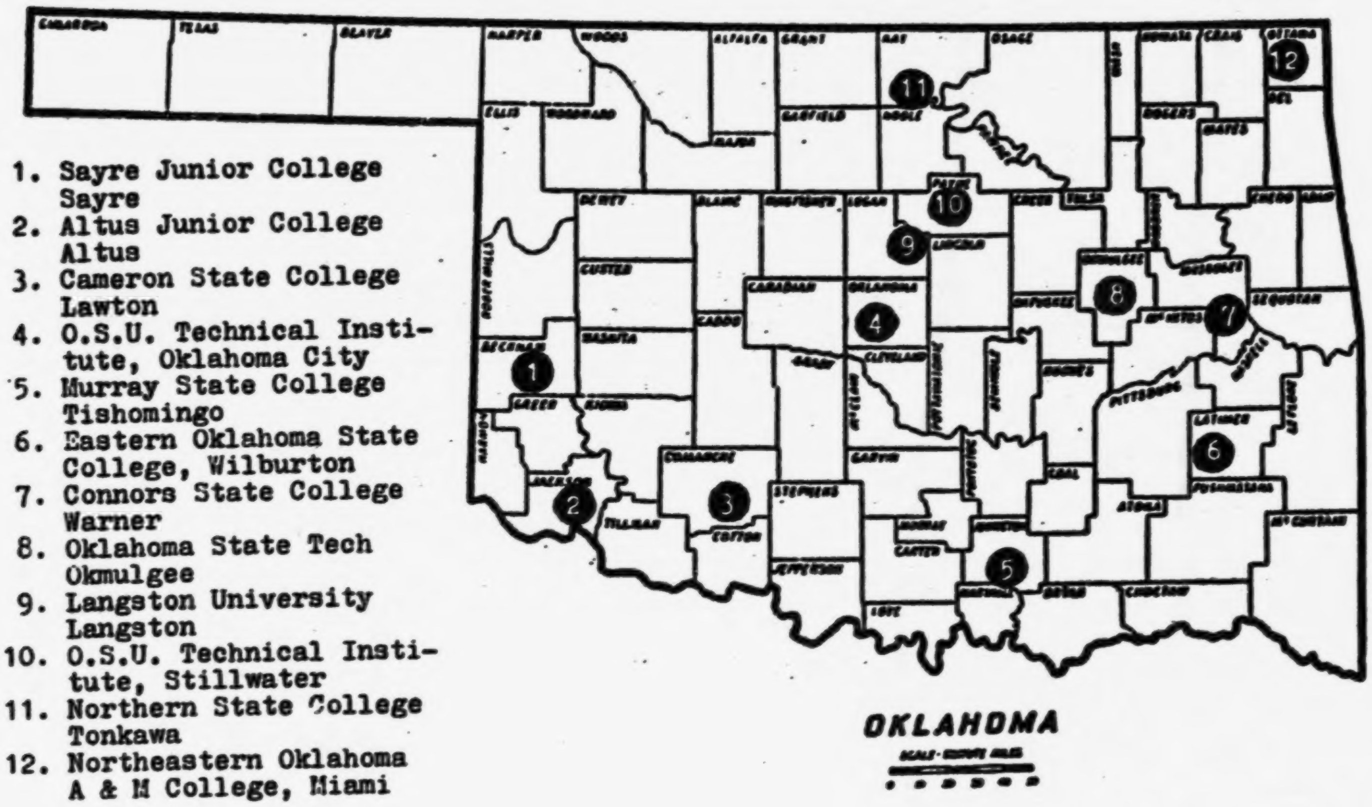
2. The major effort in developing occupational education beyond the high school in Oklahoma has been made by the Oklahoma State University.

Three technical schools operated by the university have produced 10,842 trade and technical graduates since 1946. Of this total 5,245 were in technical (engineering and science-related) fields--79 per cent of all state graduates in this category. The university leads all schools in the nation in training technical teachers--a vital element in the development of technical education services.

3. **The state's major population areas do not have adequate technical education services.**

Only one of the 12 schools offering technical programs is located in a metropolitan area. Sixty-two per cent of Oklahoma's employment potential for technical occupations and 63 per cent of the student population is in the Oklahoma City and Tulsa metropolitan areas. Only 12 per cent of the full-time enrollment in technical programs is in these areas, all of it in Oklahoma City. The Tulsa area with 23 per cent of all employed technicians has no public supported, post-high school, technical education services at the associate degree level.

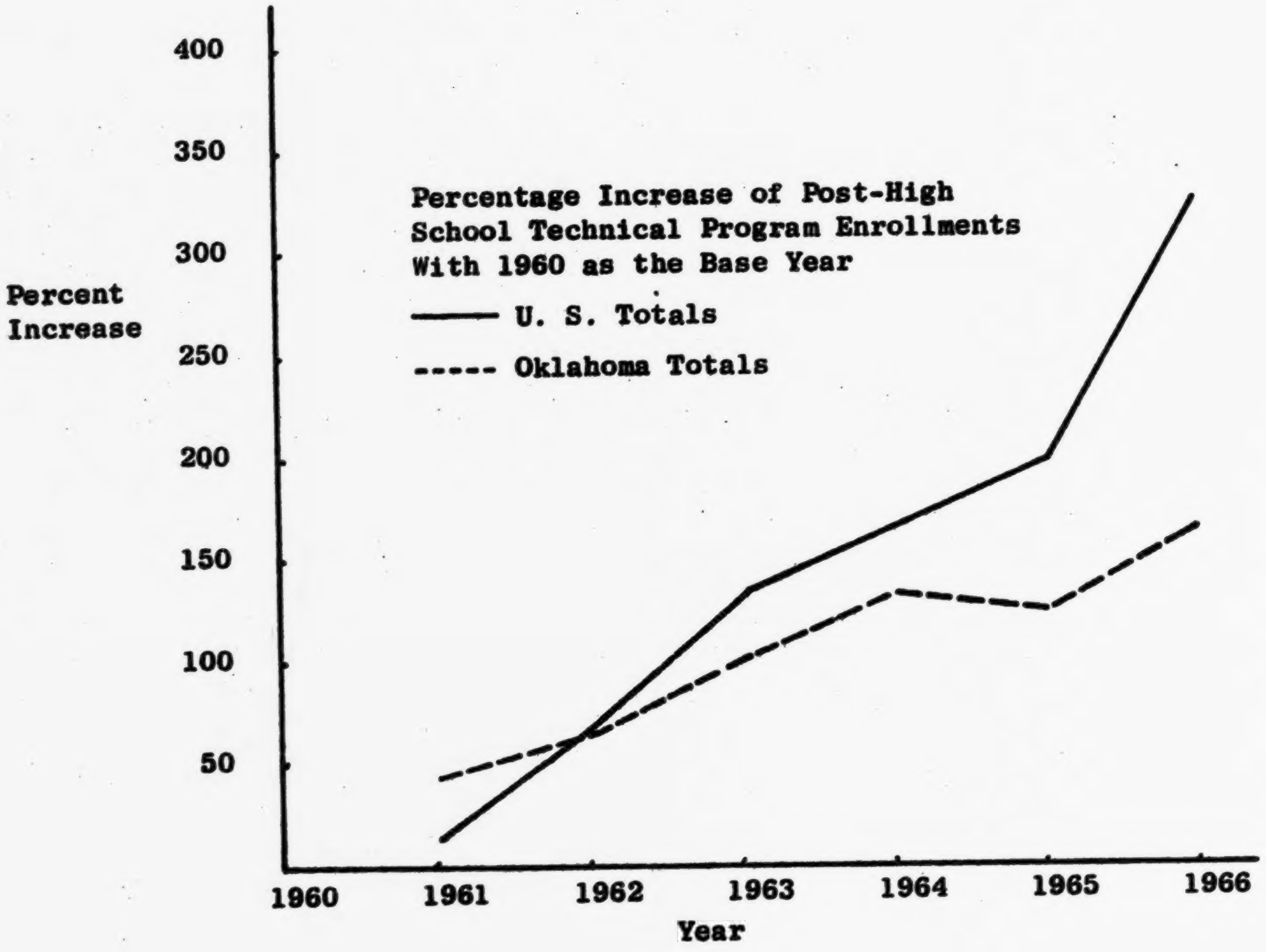
Active Post-High School Technical Program Locations: Fall 1967



1. Sayre Junior College
   Sayre
2. Altus Junior College
   Altus
3. Cameron State College
   Lawton
4. O.S.U. Technical Institute, Oklahoma City
5. Murray State College
   Tishomingo
6. Eastern Oklahoma State College, Wilburton
7. Connors State College
   Warner
8. Oklahoma State Tech
   Okmulgee
9. Langston University
   Langston
10. O.S.U. Technical Institute, Stillwater
11. Northern State College
    Tonkawa
12. Northeastern Oklahoma A & M College, Miami

4. **Oklahoma is not keeping pace with the national movement toward occupational education beyond the high school.**

Enrollments in post-high school occupational education programs of all kinds increased nationally 157 per cent from 1964 to 1966. During this same period, enrollments in Oklahoma programs of this kind increased only 18 per cent. In technical education, where Oklahoma's post-high school programs are concentrated, the increases between 1960 and 1966 were 310 per cent nationally and 158 per cent in Oklahoma.



5. Oklahoma's technical education has developed largely in four fields.

Eighty-five per cent of the 1966 fall enrollments in Oklahoma technical programs were in four fields: Drafting and design, 28 per cent; electronics, 27 per cent; mechanical (including air conditioning and refrigeration), 16 per cent; and data processing, 14 per cent. No other technical field was represented by more than 3 per cent of the enrollment. These enrollments are roughly justified according to recent estimates of technician demand by Oklahoma employers. However, eight "new" technical programs were suggested by Oklahoma industrial representatives.

Full-Time Enrollments in Public Post-High School Technical Programs in Oklahoma, Fall 1966.

SCHOOL OFFERING POST-HIGH SCHOOL TECHNICAL PROGRAM / PROGRAMS	Aeronautical	Chemical	Civil	Civil & Highway	Construction	Data Processing	Drafting	Electronics	Fire Protection	Instrumentation & Process Control	Mechanical	Medical Lab Tech.	Metals	Petroleum	Radiation	Refrigeration & Heating	Unclassified	TOTALS
Altus Junior College						24												24
Cameron State College						45	33	25										103
Connors State College							24											24
Eastern Oklahoma State College		24		15		14	20	23										96
Langston University								39										39
Murray State College							7											7
Northeastern Okla. A&M College		25				79	52	34			38							228
Northern Oklahoma College						19		20										39
Okla. College of Liberal Arts												8						8
Oklahoma State Tech., Okmulgee						35	277	178								182		672
OSU Tech. Institute, Okla. City			0			48	51	102		12						4	14	231
OSU Tech. Institute, Stillwater	51				30		62	69	49		80		17	24	28			410
Sayre Junior College								27										27
TOTALS	51	49	0	15	30	264	526	517	49	12	118	8	17	24	28	186	14	1908

6. **Oklahoma's schools are not producing the kinds and numbers of technical personnel needed to meet the state's manpower requirements in the future.**

Fifty Oklahoma organizations, employing 96,704 people in the state, estimated a need for 1,117 new employees in 1968 in occupations which normally require two years of technical education beyond the high school. Oklahoma schools are producing less than half of the number of graduates needed annually to fill these anticipated job openings. Existing vocational and technical training services are industry-oriented. Little formal training is available for technical occupations in the fields of health, biomedical, and agricultural technology.

A COMPARISON OF THE ESTIMATED NEEDS OF 50 OKLAHOMA EMPLOYERS* FOR GRADUATE TECHNICIANS IN 1968 WITH THE 1967 TECHNICIAN GRADUATES OF OKLAHOMA SCHOOLS

Existing Technical Program	1967 Technician Graduates	1968 Projected Demand
Aeronautical	9	32
Chemical	10	29
Civil	0	7
Civil & Highway	4	22
Construction	2	1
Data Processing	37	40
Drafting & Design	135	168
Electronics	120	230
Fire Protection	9	35
Instrumentation and Process Control	3	30
Mechanical	29	367
Metals	4	14
Petroleum	0	13
Radiation	11	0
Refrigeration and Heating	57	11
TOTALS	430	999

*These organizations employ an estimated 60 per cent of the state's technicians in the fields shown.

7. Oklahoma's post-high school programs in technical (engineering and scientific) fields are operating at about half capacity.

Forty full-time two year programs in 15 technical fields enrolled a total of 1,900 students in 1966. The optimum number that could be accommodated in these programs is 3,703. The reasons for this lack of interest are not immediately apparent. Additional research is needed in this area.

PRESENT AND POTENTIAL* ENROLLMENT IN 40 STATE PROGRAMS OF TECHNICAL EDUCATION

School	Number of Programs	Full-time Enrollment Sept. 1966	Estimated Capacity	"Empty" Chairs
Altus Junior College	1	24	30	6
Cameron State College	3	103	190	87
Connors State College	2	24	200	176
Eastern State College	5	96	235	139
Langston University	1	39	40	1
Murray State College	1	7	60	53
Northeastern Oklahoma A & M College	4	228	460	232
Northern Oklahoma College	2	39	123	84
O.S.U. Tech, Okmulgee	3	672	1,258	586
O.S.U. Tech, Okla. City	4	231	400	169
O.S.U. Tech, Stillwater	9	410	672	262
Sayre Junior College	1	27	35	8
TOTALS	36	1,900	3,703	1,803

* Estimates prepared in August 1967, by officials at each school based on the capacity of existing facilities.

8. Oklahoma technical schools have unused potential for industrial development.

Electronics training is offered in 10 Oklahoma Schools. These schools enrolled a total of 517 full-time students and produced 121 graduates in 1967. The 10 programs could accommodate 944 students and produce between 300 and 400 graduates per year in existing physical facilities.

Eight Oklahoma schools provided technical programs in drafting and design in 1966, enrolling 526 full-time students and producing 134 graduates. The eight existing drafting and design programs could enroll 902 students and produce from 300 to 400 graduates per year.

Electronics technicians, draftsmen, and designers are in short supply throughout the nation. Oklahoma schools could produce these highly skilled technicians in sufficient quantity to supply new or expanding industries.

9. Oklahoma industries are not employing available graduates of Oklahoma technical schools.

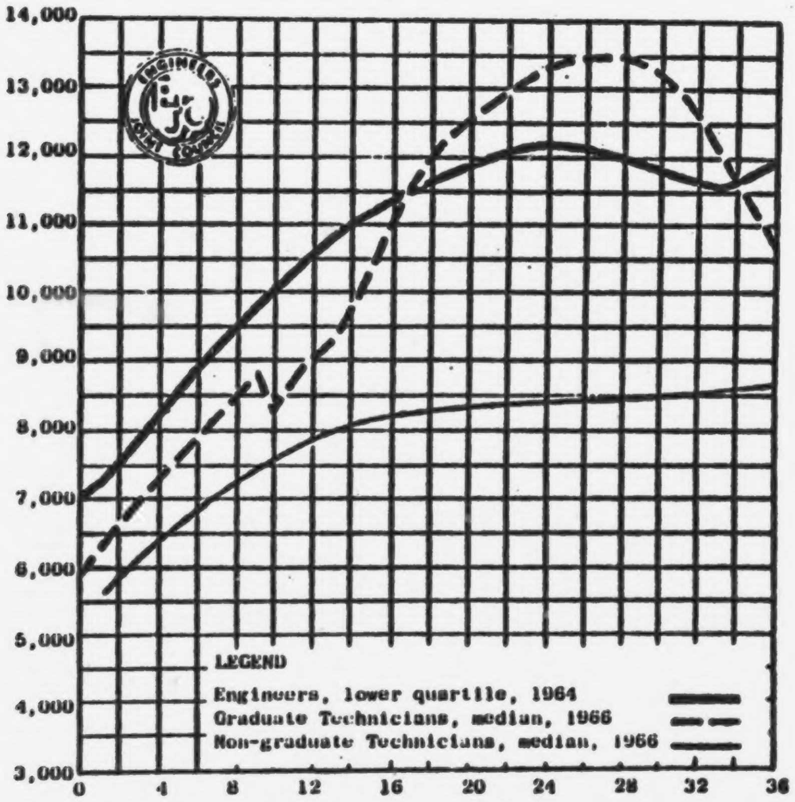
Out-of-state firms outnumbered Oklahoma firms at a ratio of almost 3 to 1 in job offers made to technician graduates in 1967. Less than one-half of those who reported accepting employment were employed in Oklahoma. However, 90 per cent of those who took out-of-state employment would return to Oklahoma if better jobs became available. Of the 50 technician graduates who took employment out of state, only 9 had received a job offer from an Oklahoma employer.

10. **The graduate technician's role in Oklahoma's economic development is not being fully realized.**

Technician graduates from Oklahoma's schools repay their personal investment in 3-1/4 years. Through increased productivity these graduates repay society's investment in four years.

11. **Opportunities for graduate technicians are excellent in fields of engineering and science.**

Starting salaries for associate degree graduates of Oklahoma technical schools averaged approximately $510 per month in 1967. Median salaries for all graduate technicians working in engineering and scientific fields exceed $13,000 per year after 23 years of employment. Median salaries for nongraduates working in the same occupations top out at approximately $8,500 per year after 13 years.



Comparison of annual salary of engineers, graduate technicians, and nongraduate technicians by years since graduation for all industry. The graph shows that the average technical school graduate is able to achieve the salary of a graduate engineer.

12. Employment opportunities for graduate technicians are expected to improve markedly in the future.

More than 90 per cent of the employers participating in the statewide study indicated plans to employ more graduate technicians in the future. The major reasons were: (1) growth of present activities, (2) restructuring of tasks formerly assigned to engineers, (3) work becoming more technical, and (4) new activities.

13. Business, office, distributive, and paramedical programs at the associate degree level have not been developed in Oklahoma.

Business and office enrollments in higher education institutions emphasize the baccalaureate degree with the proprietary schools having the majority of the state's vocational enrollments. Post-high school distributive education programs are not available and paramedical programs are in the early stages of development in Oklahoma.

14. All schools now providing two year post-high school technical programs in Oklahoma are needed to meet the demand for technical graduates and to serve students with different characteristics.

Technical education programs at junior colleges, technical institutes, and residential vocational-technical schools serve students with different characteristics. Students at these institutions in Oklahoma were found to be different on a number of personal and social background characteristics, to come from different socioeconomic backgrounds, and to differ on measures of scholastic ability.

CHAPTER I

INTRODUCTION

Education and training beyond the high school is vital to the continuous economic growth of any state. The critical point of need is at an intermediate level, in specialized programs of instruction designed to prepare persons for employment. Oklahoma, with a network of colleges and universities throughout the state, is firmly committed to a program of higher education. The value of college and university education is well known. What is not so well understood is the relative significance of less-than-baccalaureate degree training which can provide skills and knowledge for thousands of capable young people and adults who either do not enter college, or enter but do not complete a professional degree program.

If Oklahoma is to make steady progress in the years to come, the state must develop an intermediate level of education--a comprehensive system of post-high school educational services for youth and adults who need occupational education. Without such training the state will be saddled with both the unemployed and the underemployed--both representing a great economic loss. It should be recognized, also, that serious social problems can arise if we continue to encourage young people to attain a "college education" and fail to provide alternatives for those who do not enter and complete a four year degree program. Among those who want and need specialized training at the college level are many able people who could add materially to the state's economic growth.

The purpose of this study was to identify existing occupation education services in Oklahoma, other than the vocational education programs in public high schools, and to relate these services to Oklahoma's social and economic needs for the future.

Throughout the course of this statewide effort, the study team was mindful of the need for specialized training of many types and at many levels for out-of-school youth and adults. From the outset, however, it was a judgment of the study directors that any future system of occupational education in Oklahoma, to be successful, must be based in strategically located technical schools and community colleges. Only established institutions of this kind can attract and hold the competent technical specialists who are so vital to the success of the total program. These specialists, in turn, are key people who can analyze specific training needs for new and expanding industry, assist part-time teachers from industry to develop training programs, develop training guides and instructional materials, provide the image which is attractive to Oklahoma adults and youths, and evaluate the effectiveness of these special programs. For this reason the study gave primary attention to institutions and training programs that give permanence and stability to the total program and provide a structure, within which technical specialists can work.

STUDY PROCEDURES

The study was conducted in two stages. First, a thorough analysis was made of the state's existing occupational education services. Available data was gathered and compiled on institutions, programs, graduates, potential population to be served, enrollments, and employment potential. On the basis of this information it was estimated that at least 10,000

Oklahoma high school graduates, each year, do not have appropriate educational opportunities. This information is contained in the first study report published in September, 1967. This report also included estimates of the need for technical personnel in Oklahoma based on generalized data from several sources. In summary, it was evident that the current output of technical graduates from Oklahoma schools was not sufficient to meet the estimated needs of Oklahoma employers in the future.

The second phase of the study was devoted primarily to obtaining a more accurate measure of employment practices in occupations which require extensive technical education beyond high school. The occupations included were those in industry and government which involve work in engineering and scientific fields but do not require education to the level of the baccalaureate degree. Also, additional information was obtained on the characteristics of students entering technical programs and the mobility of technical graduates.

Employment information was obtained by conducting a series of seven work conferences with representatives of Oklahoma industry and government. Student characteristics were identified by assembling the 1967 entering students at four Oklahoma schools and obtaining their responses to a questionnaire designed for this purpose. A follow-up study of 1967 June graduates obtained information on placement in and out of Oklahoma and some of the factors which influence graduates to leave the state. In addition, costs and benefits of Oklahoma technical programs were analyzed.

A PRIORITY OF NEEDS

During the year of intensive work required to collect and record information the study staff met with many of Oklahoma's leading industrialists, business executives, city officials, and educators. It became increasingly apparent as the study progressed that few people outside of those directly involved with technical education fully understand its place in the educational structure. This lack of clear visability coupled with the general misunderstanding created by statistics on the high percentage of Oklahoma high school graduates who "go on to college" points to some basic needs that must be met if a significant post-high school system of occupational education is to be developed.

In the order of their importance these basic needs are: (1) statewide planning; (2) separate funding; (3) an open-ended system of occupational education; and, (4) a coordinated system of manpower development that will include manpower research, industrial planning services, and occupational education.

The Need for Statewide Planning

Oklahoma's occupational education services have been developed over the years by a number of separate institutions and agencies. Very little statewide planning has been done. Programs have been established by popular demand without reference to specific employment opportunities or industrial development needs within the state. The result of this unplanned growth has been a division of responsibility and authority. Post-high school occupational education has made little impression on the general public, in spite of the excellent programs that have been developed at a few institutions in the state. Lacking a unity of purpose or a voice of authority and operating in the shadow of traditional higher education programs, this vital part of our education system is virtually an unknown quantity.

The Need for Separate Funding

Occupational education beyond the high school has developed to this point without a planned system of funding. Only in recent years, when federal funds became available for this specific purpose has any identifiable financial support appeared to develop and operate these programs on a statewide basis. Even with federal support it has been necessary, literally, to divert funds from other educational programs, since federal monies required matching on a local or state basis. Much credit must be given to the courage and vision of those school administrators who have developed occupational programs in spite of meager budgets and pressing needs for other, well established, programs. It is obvious that, whatever system of administrative control is chosen for this kind of education for Oklahoma in the future, separate funding will be required. No agency, board of control, or institution can be expected to develop a viable system if it must compete for funds with other better established, and more "popular" programs. Without central planning and administration, scarce funds can be spread thinly over a large number of programs with the result that none will be adequately supported. Poorly staffed and equipped, these programs will carry a negative image of occupational education at a time when everything possible should be done to improve this image.

The Need for a Vertical Structure of Occupational Education

Any long-range plan to develop a comprehensive occupational education system in Oklahoma must include a practical solution to the problem of obtaining recognition and respect for this kind of education. It must become a recognized part of the higher education system. Eventually, the nationwide trend toward a more democratic education system will force a relaxing of the present rigid higher education structure. When this occurs, a vertical structure of occupational education will exist that will enable a high school graduate to obtain occupational education to the level of his or her ability without being penalized. Today, the lack of such a structure is the greatest deterrent to the development of a viable occupational education system.

Oklahoma could gain national recognition by developing a truly open-ended system of post-high school occupational education with entry and exit possible at all levels up to and including the baccalaureate degree. Developing such a system would perhaps do more to build a solid base for occupational education than any other action the state could take at this time. An open-ended occupational education system would attract many capable young people and adults who,because of economic reasons, or because of special interests, want to prepare for a technical occupation, obtain employment, and, at some later time, continue their formal education. Even though the technical training required for many of today's emerging occupations is specialized in nature, much of it is definitely college level. Incorporating this kind of high grade post-high school study in a baccalaureate degree program requires only a willingness on the part of the higher education community to design a suitable curriculum with the necessary flexibility.

The Need for a System of Manpower Development

There is general agreement among the various groups working to increase Oklahoma's rate of industrial growth that a coordinated system of manpower development is urgently needed. The vital elements of such a system are manpower research, industrial planning services, and occupational education. The responsibility and authority for these three fundamental services should be centralized in one administrative unit within the state.

Some states, notably South Carolina, have attempted to achieve this coordination by establishing a state commission, authorizing this commission to provide all of these services, and appropriating the necessary funds. This method has been especially effective in states with little or no vocational training beyond high school and limited higher education opportunities for young people in junior colleges, and four year state colleges and universities. In these states large numbers of young people and adults are available to be trained for employment in new industries.

By comparison Oklahoma has 35 institutions of higher education and 63 per cent of the state's high school graduates continue in some phase of higher education. Every able student is encouraged to "go to college." The fact that only 20 per cent of the school age population continue to the baccalaureate degree level is broadly overlooked. The greatest untapped resource in Oklahoma is the approximately 10,000 young people with average or better ability who, each year, leave the education system with only a general education exposure. Occupational education must be made an integral part of the higher education system if it is to serve this highly significant, college-oriented, segment of the state's population.

An equally important function of the system is adult training and retraining. Special training programs should be made available where and when they are needed. But these special programs must be backstopped by experienced industrial education specialists with the resources of an institution at their disposal. If, as many have suggested, occupational training is the key to industrial development, the major problem in

Oklahoma is to make the best possible use of existing institutions, programs, and personnel by effecting an integration of these services with industrial planning and development.

The key element in any system of manpower development is training. Research and planning services are in a sense staff functions. Important as these services are, they are only effective if trained manpower is produced. A central administrative unit should be established with the responsibility for all three services and the authority to set up and fund special training programs. This administrative unit should be responsible for the planning and development of all occupational education beyond high school.

A central administrative unit could take one of several forms. It could be a state commission. The Regents for Higher Education could set up a special section. A consortium could be formed that would include all of the schools with occupational programs. The Oklahoma State University, which now operates approximately 70 per cent of the post-high school programs, could establish a special division within the university. Each of these alternatives has advantages and disadvantages. Whatever system is chosen must have support and assistance from every possible source if it is to accomplish its purpose. An advisory board made up of top executives from business and industry could lend great strength to the system. Most important of all, the general public must understand the social and economic benefits that accrue from a sound program of occupational education before Oklahoma can expect to have a well-balanced education system.

CHAPTER II

TRENDS IN OCCUPATIONAL EDUCATION BEYOND THE HIGH SCHOOL

The nationwide emphasis on occupational education in recent years has focused attention on a need to provide training for youth and adults who have completed or left high school. Many studies of educational needs in recent years, starting with the 1963 report of the President's Panel of Consultants on Vocational Education, have recommended increased effort in this area. The Vocational Education Act of 1963 provided a substantial amount of money for this purpose, with the result that post-secondary programs have increased rapidly since that time. Beginning with the 1964 fiscal year, the U.S. Office of Education has reported, separately, the total enrollments in post-secondary vocational and technical programs reimbursed in any part with federal funds. From 1964 to 1966 these reported enrollments increased from 170,835 to 438,469, an increase of 157 per cent.

Post-secondary occupational education includes a great variety of programs and short courses. Perhaps the best known, and certainly the largest, grouping is made up of industrial education programs under the general title of "technical education." The National Defense Act of 1958 focused attention on the need for highly skilled technicians in occupations essential to the national defense and the major thrust in vocational education beyond the high school in recent years has been in this area. It is possible that an even greater effort will be made in the next few years to develop similar programs in the health services, business fields, and agricultural technologies. Another section of this report deals with the population that might be served if and when an extensive system of post-secondary occupational education is developed in Oklahoma.

The major effort to date in Oklahoma has been in the industrial-technical area. The State Department of Vocation has, since 1960, supported this area with federal funds appropriated under the provision of the National Defense Education Act of 1958 and a small annual appropriation of $25,000 from the state. Because of the state's present concentration on technical education and in view of the significance of technical manpower in Oklahoma's industrial development, this study deals primarily with technical education services. The following section is included to define this area of services and to provide useful information for planning improvements in Oklahoma's educational system.

The Nature of Technical Education

It is apparent that long-existent semantic problems in occupational education still continue to cause misunderstanding and confusion, making it extremely difficult to communicate in precise terms with school administrators, government officials, and representatives of business and industry. One of the terms not yet fully understood in Oklahoma is technical education. Even though this term is being widely used to describe the "new look" in occupational education, it is far from being a standardized term. The following section is included to delimit the term as it is used in the report.

A number of useful definitions for technical education are available, some general and some very specific. Where the term is used to describe a formal program of occupational studies at the associate degree level, certain specifics can be identified.

1. The program is usually two years in length.
2. The content is derived from technical skills and knowledge requirements of technical occupations.
3. Mathematics and the physical or biological sciences are integral parts of the program; technical study is mathematics and science-based at all levels of the program.
4. The technical specialization is within an occupational field; but is not confined to, or limited by, the requirements of any single occupation or industry. The emphasis in instruction is placed on technical skills and knowledge that have broad applications.
5. Instruction is laboratory-oriented and makes use of many applications of the technical principles being studied. The emphasis is placed on analytical, rational thought processes rather than on the development of specific procedural techniques or skills.

In terms of educational objectives, technical education is student-oriented first and industry-oriented second. That is to say, the long-range interests of the student have priority over the immediate needs of any single industry or group of industries. There is much evidence that industries which make use of technicians understand and support this concept. No real conflict exists between the interests of the student and those of industry.

J. A. Patterson[1] of Texas Instruments, Dallas, Texas, expresses an industry's point of view which is typical of those industries where technician classifications are well established.

> With the rapid technological advance we are using less correspondence school and self-educated people and concentrating our recruiting efforts on the Associate Science degree holding. The A.S. degree technician has greater long-range potential, is more versatile, and can relieve the engineer of many less complex duties so that he can concentrate on more sophisticated and creative engineering functions.

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[1] Joseph A. Patterson, An Employer's Viewpoint, a paper prepared for the 1966 national Clinic on Technical Education, Miami, Florida, October 1966.

The Oklahoma Technical Education Council* has adopted the following definition of Technical Education:

> Technical Education is a planned sequence of classroom and laboratory experiences, usually at the post-secondary level, designed to prepare men and women for a range of job opportunities in well-identified fields of technology. The program of instruction normally includes study in mathematics, the sciences inherent in a technology, and selected skills, materials, and processes commonly used in the technology. Complete technical education programs provide intensive training in a field of specialization, and include basic communication skills as well as general education studies. Instruction in technical programs gives major emphasis to principles rather than to specific techniques or skills. Industrial applications of these principles are used wherever possible in the instructional program.
>
> The technical curriculum should prepare the graduate to: (1) obtain a job, (2) be a productive employee with a minimum of additional on-the-job training, (3) advance with the developments in the technology, and (4) continue his education through extension or other supplementary training programs.
>
> In terms of a continuum of technological occupations, technical education prepares for the area between the operator or special skill jobs and the established professions such as medicine, engineering, and science.
>
> The technician is frequently employed in industrial activities in direct support of the professional employee, performing such duties as designing, developing, testing, or modifying products and processes; planning production; writing reports; preparing estimates; analyzing, diagnosing, and solving technical problems.
>
> Technical personnel also are employed in the agricultural sciences, life sciences, and biological sciences in occupations which require preemployment technical education.

This definition is essentially the same as one to be used in a manual, "Standard Terminology for Instruction in Local and State School Systems," being prepared by the U.S. Office of Education.

It should be pointed out that technical education is not limited to two-year programs of instruction, although associate degree programs make up the largest grouping. Three- and four-year programs are offered in this field. It is probable that, in the near future, some four-year degree curriculums will be especially designed to accommodate a limited number of associate degree graduates who want and need additional education at the baccalaureate degree level.

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*The Oklahoma Technical Education Council was formed October 28, 1966 and the membership consists of chief administrators of post-high school occupational programs and area vocational-technical schools; State department of vocational-technical personnel, and teacher trainers.

The Technical Curriculum

Perhaps one of the best ways to identify the scope and level of technical education is to describe the content of a high standard two year curriculum. A curriculum of this type has certain unique characteristics. It will differ in significant ways from the traditional first two years of a four year degree program. Figure 1 shows an outline for a two year (72 semester credit hour) curriculum in electronic technology.

To illustrate the great difference between a two year occupational program and the first two years of a baccalaureate degree, Table 1 compares two such programs, using the two year electronic technology program shown in the preceding table and the first two years of a four year electrical engineering degree program. In the technical curriculum, 58 per cent of the subject matter is devoted to the technical specialty, electronics. In the electrical engineering program only 8 per cent is specialized. Mathematics and science make up 48 per cent of the lower division engineering course work. The technical curriculum devotes 25 per cent of the time to formal course work in these disciplines. It should be pointed out, however, that the technical courses in the electronics technology program make extensive applications of mathematics.

The technical program in electronics is clearly functional in nature with an occupational objective. The two year study program in electrical engineering is designed to provide a base for further study.

CURRICULUM OUTLINE
FOR
ELECTRONIC TECHNOLOGY

Course	Class Hours	Laboratory Hours	Outside Study	Total Hours	Semester Credit Hours
First Semester					
Physics for Electronics I (Electricity)	3	6	6	15	5
Technical Mathematics I (Algebra and Trigonometry)	5	0	10	15	5
Electronic Devices	3	6	6	15	5
Communication Skills	3	0	6	9	3
Total	14	12	28	54	18
Second Semester					
Physics for Electronics II (Mechanics and Heat)	3	3	6	12	4
Technical Mathematics II (Applied Calculus)	4	0	8	12	4
Circuit Analysis--AC and DC	3	6	6	15	5
Electronic Amplifiers	3	6	6	15	5
Total	13	15	26	54	18
Summer Session (Optional)					
Studies to meet special requirements of State or institution.					
Third Semester					
Instruments and Measurements	3	6	6	15	5
Communication Circuits	3	6	6	15	5
Introduction to Computers	4	3	8	15	5
Technical Reporting	2	0	4	6	2
Drawing, Sketching, and Diagramming	0	3	0	3	1
Total	12	18	24	54	18
Fourth Semester					
Control Circuits and Systems	3	3	6	12	4
Communication Systems	3	3	6	12	4
Electronic Design and Fabrication	1	5	0	6	2
Introduction to New Electronic Devices	2	0	4	6	2
General and Industrial Economics	3	0	6	9	3
Industrial Organizations and Institutions	3	0	6	9	3
Total	15	11	28	54	18

Figure 1. A Curriculum Outline for an Electronics Technology Program.

Source: Electronic Technology, OE 8009A, Technical Program Series No. 2A, U.S. Office of Education.

Some of the confusion regarding technical education has been caused by compromising these two objectives. Such compromises appear frequently in junior college curriculums where administrators insist that course credit must be "transferrable."

TABLE 1

A COMPARISON OF A TWO-YEAR TECHNICAL PROGRAM WITH THE FIRST TWO YEARS OF AN ENGINEERING DEGREE PROGRAM

Subject Matter	2-Year Electronics Technology (Semester Credit Hours)	First 2 Years of Electrical Engineering (Semester Credit Hours)
Specialized Technical Courses	42	5
Mathematics and Science	18	31
Auxiliary Technical Courses	3	8
General Education Courses	9	21
TOTAL - - - - - - - - - - - - - - - -	72	65

Confusion arises, also, in making distinctions between training for highly skilled occupations and technician training. Basic differences between such programs appear in the instructional procedures, as well as in the content. Training for skilled occupations requires that much time be spent in manipulative skill development--practice in the skill required for success in a specific trade or craft. Technical education must emphasize cognitive skills--principles of science and technology that have broad application. Hence, the instruction in a technical program must be mathematics and science based with an emphasis on problem-solving, using as many industrial applications as possible to make learning realistic and interesting.

National and State Trends in Technical Education

Oklahoma is not keeping pace with the rest of the United States in the development of occupational education services. Table 2 compares reported enrollments in all United States vocational and technical programs with Oklahoma enrollments for the period from 1960 to 1966. Enrollments in all vocational and technical education increased nationally from 3,768,149 in 1960 to 6,070,059 in 1966, an increase of 63 per cent. Oklahoma enrollments increased from 70,365 to 78,621 during this period, an increase of 11.7 per cent. From 1960 to 1966 enrollments in full time post-secondary technical education programs increased nationally from 24,420 to 103,534, an average increase of 27 per cent per year. The growth in Oklahoma post-secondary technical education enrollments during the 6-year period was from 665 to 1,754, an average of 18 per cent per year.

TABLE 2

ENROLLMENTS AND GRADUATES IN FEDERALLY REIMBURSED PROGRAMS OF VOCATIONAL AND TECHNICAL EDUCATION FOR FISCAL YEARS 1960 TO 1966

Programs and Percentages	FY 1960	Pct	FY 1961	Pct	FY 1962	Pct	FY 1963	Pct	FY 1964	Pct	FY 1965	Pct	FY 1966	Pct
All Vocational and Technical														
U. S. Totals	3,768,149	100	3,855,564	100	4,072,667	100	4,217,198	100	4,566,390	100	5,430,611	100	6,070,059	100
Oklahoma Totals	70,365	1.9	73,205	1.9	71,149	1.7	73,184	1.7	73,861	1.6	76,523	1.4	78,621	1.3
Technical Education (Full-Time Post-Secondary)														
U. T. Totals	24,420	100	27,446	100	40,043	100	56,226	100	71,824	100	71,845	100	103,534	100
Oklahoma Totals	665	2.7	957	3.5	1,068	2.7	1,331	2.4	1,569	2.2	1,501	2.1	1,717	1.7
Graduates of Full-Time Post-Secondary Technical Programs														
U. S. Totals			5,699	100	6,431	100	8,180	100	10,952	100				
Oklahoma Totals			282	5.1	252	5.5	285	3.9	379	3.5	474		472	

Source: U. S. Office of Education Reports, State Department of Vocational Education Reports, and School Records.

Figures for the number of graduates from full time post-secondary technical programs are shown in Table 2 for fiscal years 1961 through 1964. The U.S.O.E. system for reporting enrollments and graduates was changed in 1965 and technical program figures were not separated from other post-secondary figures after FY 1964. Comparisons for the four year period of 1961-1964 show that the number of graduates nationally and in Oklahoma increased 92 per cent and 27 per cent respectively.

TABLE 3

STATE AND FEDERAL EXPENDITURES IN VOCATIONAL AND TECHNICAL EDUCATION PROGRAMS USING FEDERAL FUNDS*
Fiscal Years 1960 through 1966
in Thousands of Dollars

	FY 1960	FY 1961	FY 1962	FY 1963	FY 1964	FY 1965
U.S. Totals in V-T Ed.	127,779	137,164	155,702	167,267	180,001	343,671
Okla. Totals in V-T.Ed.	1,771	1,817	1,894	1,776	1,738	3,838
U.S. Totals in Technical Ed.	8,894	12,062	16,500	21,047	22,050	
Okla. Totals in Technical Ed.	183	243	392	369	288	364

*Does not include local expenditures.

The combined totals of federal and state expenditures for vocational and technical education are shown in Table 3 for fiscal years 1960 through 1965. Federal and state reports do not break down expenditures for post-high school technical education. Consequently, the technical education figures shown include expenditures for both secondary and post-secondary programs. Characteristically, about 10 per cent of the enrollment in technical education is in secondary school.

Expenditures for all reimbursed voactional and technical programs in Oklahoma increased at a slightly lower rate than national expenditures during this period. However, expenditures for technical education in Oklahoma have declined, reaching a peak of $392,962 in 1962 and decreasing in subsequent years, reaching a low of $288,478 in 1964. In 1965 they rose again to $364,205. Expenditures for 1966 (not shown) decreased again to $333,798. The reasons for this reduction in support for technical education in Oklahoma are not apparent, since enrollments in Oklahoma technical programs continued to increase during this period, as did national expenditures and enrollments in technical education.

The U.S. Office of Education has made projections for enrollments in vocational and technical education through 1975. Table 4 gives these projections and, using the percentage increase developed by the U.S.O.E., makes projections for the Oklahoma enrollments.

The U.S. totals shown in the table for 1970 and 1975 provide a basis for making the projections of Oklahoma totals for vocational and technical enrollments in these years. Projections for Oklahoma full time post-secondary technical enrollments in 1970 and 1975 were obtained by using the percentage increases in U.S. technical enrollments for each of these years. The ratios of U.S. technical to U.S. totals for each year were used to obtain the projected Oklahoma technical enrollment in 1970 and 1975. To meet these goals Oklahoma would have to increase the effort in vocational and technical education 149 per cent between 1966 and 1975. In reality, national figures may not be applicable in Oklahoma because the Oklahoma population in the age group 14 to 22 is a much lower percentage of the total population than is true for the nation as a whole.

TABLE 4

ACTUAL AND PROJECTED ENROLLMENTS--VOCATIONAL AND TECHNICAL EDUCATION TOTALS FOR U.S. AND OKLAHOMA

Enrollments and Percentages	1965 Actual	Pct	1966 Actual	Pct	1970 Projected	Pct	1975 Projected	Pct
U.S. Totals, Vocational and Technical Ed	5,430,611	100.0	6,070,059	100.0	9,600,000	100.0	14,000,000	100.0
U.S., Technical Ed	255,737	4.7	255,786	4.2	470,000	4.9	850,000	6.1
Oklahoma Totals, Vocational & Tech	76,523	100.0	78,333	100.0	132,000*	100.0	195,000*	100.0
Oklahoma, Technical	3,850	5.0	4,168	5.3	7,920	6.0*	13,460	6.9*
Oklahoma, Full Time Post-Secondary Tech	1,501	---	1,717	---	2,300**	---	3,050**	---

* Based on U.S.O.E. Projected Percentage Increases for U.S. Totals.

** Based on a straight-line projection of Oklahoma full time, post-secondary enrollments 1961-1967, (See page 41)

Note: Projected figures are rounded to nearest 10 or nearest 1,000.

CHAPTER III

THE DEVELOPMENT OF OKLAHOMA'S PRESENT OCCUPATIONAL EDUCATION SYSTEM AT THE POST-HIGH SCHOOL LEVEL

Oklahoma's present occupational education system at the post-high school level is characterized by different institutional types, boards of control, and operational goals. An effort will be made in this chapter to describe the institutions and their boards of control, and to present the basic statistical data on technical, business, and paramedical programs. The freshman and sophomore enrollments in certain business programs are listed since it became evident that some students terminate their work at this level and gain employment. As mentioned in the introduction to the study, this data will be utilized in the design for further research to be reported in January of 1968.

The Development of Institutions Offering Post-High School Occupational Education

It is necessary in a preliminary report of this nature to examine the development of institutions which offer post-high school occupational education. The type, level, and quality of our present programs are the outgrowth from the history of the institutions which provide these services. An effort will be made in this section to present in brief form information about the establishment of the state and locally supported public institutions of higher education in Oklahoma and their boards of control. The institutions will be grouped together according to their present governing boards.

The University of Oklahoma

The University of Oklahoma, which offers paramedical and business programs, was established on December 19, 1890*, by the first Legislative Assembly of the Territory of Oklahoma. Its governing board is the Board of Regents of the University of Oklahoma. This board governs the operations of the University as well as three constituent agencies, the School of Medicine, the University Hospitals, and the Geological Survey.[2] This board of regents has governed the University of Oklahoma since 1890 with the exception of the period from March 6, 1911, until April 3, 1919; during which time the State Board of Education governed this school and all other institutions of higher education in the state except for the agricultural and mechanical colleges.[3] The education of the University was to be cultural and practical. As stated by the State Board of Regents, report number eight, "....the University of Oklahoma was assigned the tasks of producing 'scientific, industrial, and professional' personnel, school teachers, and good citizens."[4]

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* This date and all others given in this section of this report were taken from a doctoral dissertation written in 1956 by E.T. Dunlap unless otherwise noted.

[2] Oklahoma State Regents for Higher Education, The Oklahoma State System of Higher Education, (Oklahoma City, Oklahoma: February, 1963), p. 5.

[3] E.T. Dunlap, The History of Legal Controls of Public Higher Education in Oklahoma, unpublished doctoral dissertation, Oklahoma Agricultural and Mechanical College, 1956, p. 31.

[4] Oklahoma State Regents for Higher Education, Goals for Oklahoma Higher Education, self study of higher education in Oklahoma, Report 8, (Oklahoma City, Oklahoma: September, 1966), p. 5.

The Agricultural and Mechanical Colleges

The Agricultural and Mechanical College of the Territory of Oklahoma was established by an act of the Legislative Assembly effective December 25, 1890. This institution, later called Oklahoma A & M College and now Oklahoma State University, was established under terms of the Morrill Act of 1862,[5] with the technical institute operational in 1937.

Oklahoma State University has two branches geographically apart from the main campus at Stillwater. The Technical Institute in Oklahoma City was established in 1961.[6] The Oklahoma State University School of Technical Training at Okmulgee was organized on October 1, 1946, and now offers close to thirty areas of study in technical, business, and vocational fields.

The agricultural and mechanical colleges of the state have been under various boards of control since their inception, but on July 11, 1944, an amendment was added to the Oklahoma constitution which created a Board of Regents for the Oklahoma Agricultural and Mechanical Colleges of Oklahoma.[7] Thus this board governs Oklahoma State University; Oklahoma Panhandle State College, established June 10, 1909; Langston University, established March 12, 1897; Connors State College, Cameron State Agricultural College, and Murray State College, all established May 20, 1908; Eastern Oklahoma State College, established May 28, 1908; and Northeastern Oklahoma Agricultural and Mechanical College, established March 17, 1919. All of the aforementioned offer technical, business, and vocational programs. Cameron State Agricultural College instituted an associate nursing program in the fall of 1966.

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[5] Ibid.

[6] Oklahoma State University, Technical Institute, Oklahoma City Branch Catalog for 1965-1967.

[7] Dunlap, p. 106.

The functions of these agricultural and mechanical colleges have broadened throughout the years and have become multi-purpose institutions.

The State Colleges

There are six institutions in Oklahoma that were started as normal schools and are now called state colleges. They are: Central Normal School, founded April 6, 1890, at Edmond, now Central State College; Northwestern Normal School, founded March 12, 1897, at Alva, now Northwestern State College; Southwestern Normal School, founded March 8, 1901, at Weatherford, now Southwestern State College; Northeastern Normal School, founded March 6, 1909, at Tahlequah, now Northeastern State College; and East Central Normal School, founded March 25, 1909, at Ada, now East Central State College. These colleges offer no technical programs but some do contribute strongly to business enrollments with their certificate programs.

The functions of these colleges have been changed over the years as stated in report number eight of the State Board of Regents:

> Whereas the original function of the teachers' colleges had been to offer instruction pedagogy only, a legislative act in 1939 broadened their purposes to allow these institutions to 'offer courses in the various educational branches without being restricted to the purpose of educating persons in the arts of teaching.'[8]

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[8] Self-study report 8, p. 8.

And also:

> Although the six state colleges are moving from a single-purpose orientation toward a more broadened set of functions, their chief activity is still the production of teachers for the public schools of the state and the nation.[9]

These institutions have been under various boards of control as stated in the December 1, 1964, Biennial Report of the State Board of Regents of Oklahoma Colleges.

> These colleges have been under the following boards of control:

Date of Establishment to 1907	Territorial Board of Education
1907 to 1939	State Board of Education
1939 to 1943	Board of Regents of Oklahoma Colleges
1943 to 1947	State Board of Education
1947 to Present	Board of Regents of Oklahoma Colleges

> Senate Bill 33, S. L. 1947 created the State Board of Regents of Oklahoma Colleges and placed these six colleges under the supervision of said Board.[10]

Northern Oklahoma College

The University Preparatory School for the Territory of Oklahoma, now Northern Oklahoma College, was founded at Tonkawa March 8, 1901. It was established to provide secondary instruction for the students of Oklahoma in preparing them to go on to a university. In 1919, vocational training, particularly business education, became the main function of the school. The school gained college status in 1920.[11] Northern Oklahoma College has its own Board of Regents, and offers technical, business, and vocational programs.

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[9] Ibid.

[10] *Biennial Report of the State Board of Regents of Oklahoma Colleges,* Oklahoma City, Oklahoma, December 1, 1964, p. 3.

[11] Self-study report 8, p. 8.

Oklahoma College of Liberal Arts

The Oklahoma Industrial Institute and College for Girls was started at Chickasha,March 27, 1909. The State Board of Regents on July 7, 1965, made this institution coeducational, changed its name to Oklahoma College of Liberal Arts, and provided for a seven member board of regents to govern the institution.[12]

Up until 1965 the function of the school was to "give instruction in industrial arts, the English language, and the various branches of mathematical, physical, natural, and economic sciences, with special reference to their application in the industries of life."[13]

In 1965 the functions were changed, "whereby both men and women students would be admitted to pursue four years of study in the liberal arts culminating with the bachelor's degree."[14] Oklahoma College of Liberal Arts does offer work in the business administration area, but has deemphasized 2-year terminal business training.

Oklahoma Military Academy

The Eastern University Preparatory School at Claremore was established on March 25, 1909. In 1919 the purposes of the institution were to include both vocational and military training.

> The purposes of the institution remain today substantially what they were in 1919, except that the vocational training curriculum has been deemphasized in favor of the military science program.[15]

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[12] Oklahoma State Regents for Higher Education, Higher Education in Oklahoma, Vol. 1, No. 4, July 26, (Oklahoma City, Oklahoma: 1965), p. 6.

[13] Self-study report 8, p. 8.

[14] Ibid.

[15] Ibid.

The Oklahoma Military Academy does offer work in the business administration area, but does not emphasize vocational business training.

Municipal Junior Colleges

These junior colleges located at Altus, El Reno, Poteau, Sayre, and Seminole are under the control of local school boards. All offer business programs with Sayre and Altus offering technical work. These five are all that remain of the nineteen such community colleges that were in existence in Oklahoma in 1940.[16] The Oklahoma State Regents for Higher Education describe the functions of municipal colleges as follows:

> The functions of the municipal colleges closely parallel those of the state-supported junior colleges. Both of these groups are chiefly concerned with those students who will be transferring to senior colleges and universities, and as a consequence they offer relatively little in the way of vocational and technical training.[17]

In order to complete the review of post-high school institutions of higher learning offering vocational-technical programs, independent senior and junior colleges must be mentioned. Technical education is not offered in any of these institutions; however, Bacone College offers an associate nursing program and several other independent colleges offer business associate degree or certificate programs. The independent junior colleges are as follows: Bacone College, Central Pilgrim College, Saint Gregory's College, and Southwestern College. The independent senior colleges are as follows: Bethany Nazarene College, Oklahoma Baptist University, Oklahoma Christian College, Oklahoma City University, Oral Roberts University, Phillips University, and the University of Tulsa.

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[16] Ibid, p. 10

[17] Ibid.

Oklahoma State Regents for Higher Education

Article XIII-A Section One of the Constitution of Oklahoma states that:

> All institutions of higher education supported wholly or in part by direct legislative appropriations shall be integral parts of a unified system to be known as the Oklahoma State System of Higher Education.[18]

This article also created the Oklahoma State Regents for Higher Education as the coordinating board of control for all state institutions, and states the specific powers of the State Regents.

As a result of provisions stated in Article XIII of the Oklahoma Constitution, all of the aforementioned institutions rely on the State Board of Regents for setting standards of higher education and determining the functions and courses of study in each of the institutions. The nine member board has the following responsibilities:

(a) It shall prescribe standards of higher education applicable to each institution;

(b) It shall determine the functions and courses of study at each of the institutions to conform to the standards prescribed;

(c) It shall grant degrees and other forms of academic recognition for completion of the prescribed courses in all of such institutions;

(d) It shall recommend to the State Legislature the budget allocations for each institution; and

(e) It shall have the power to recommend to the Legislature proposed fees for all of such institutions and any such fees shall be effective only within the limits prescribed by the Legislature.

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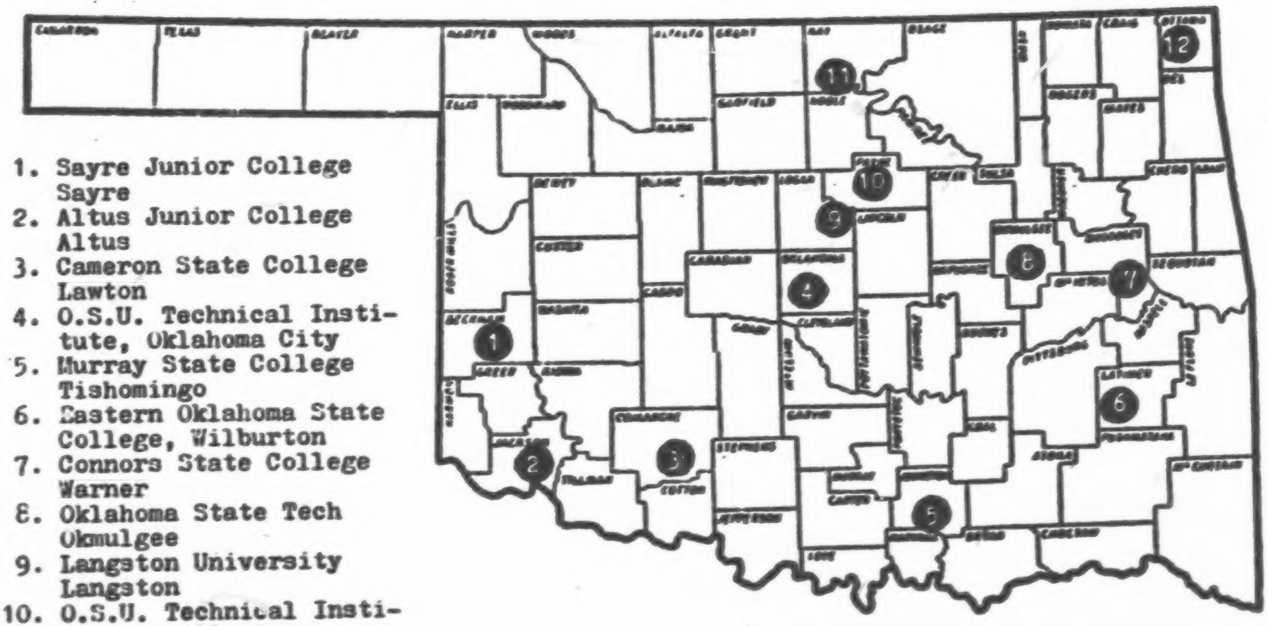
[18] Article XIII-A, Section 1, Oklahoma Constitution.

Funds are allocated to individual institutions by the State Regents from lump-sum appropriations made by the Oklahoma Legislature to the State Regents. Private, denominational, and other institutions of higher learning may become coordinated with the State System of Higher Education under rules and regulations adopted by the State Regents.

The Chancellor, as chief administrative officer of the State Regents, has the following responsibilities:

a) To see that policies and programs of the State Regents are executed; b) to gather information about the state system and make recommendations to the Regents; and c) to provide state level leadership for coordination of activities affecting all institutions in the state system.

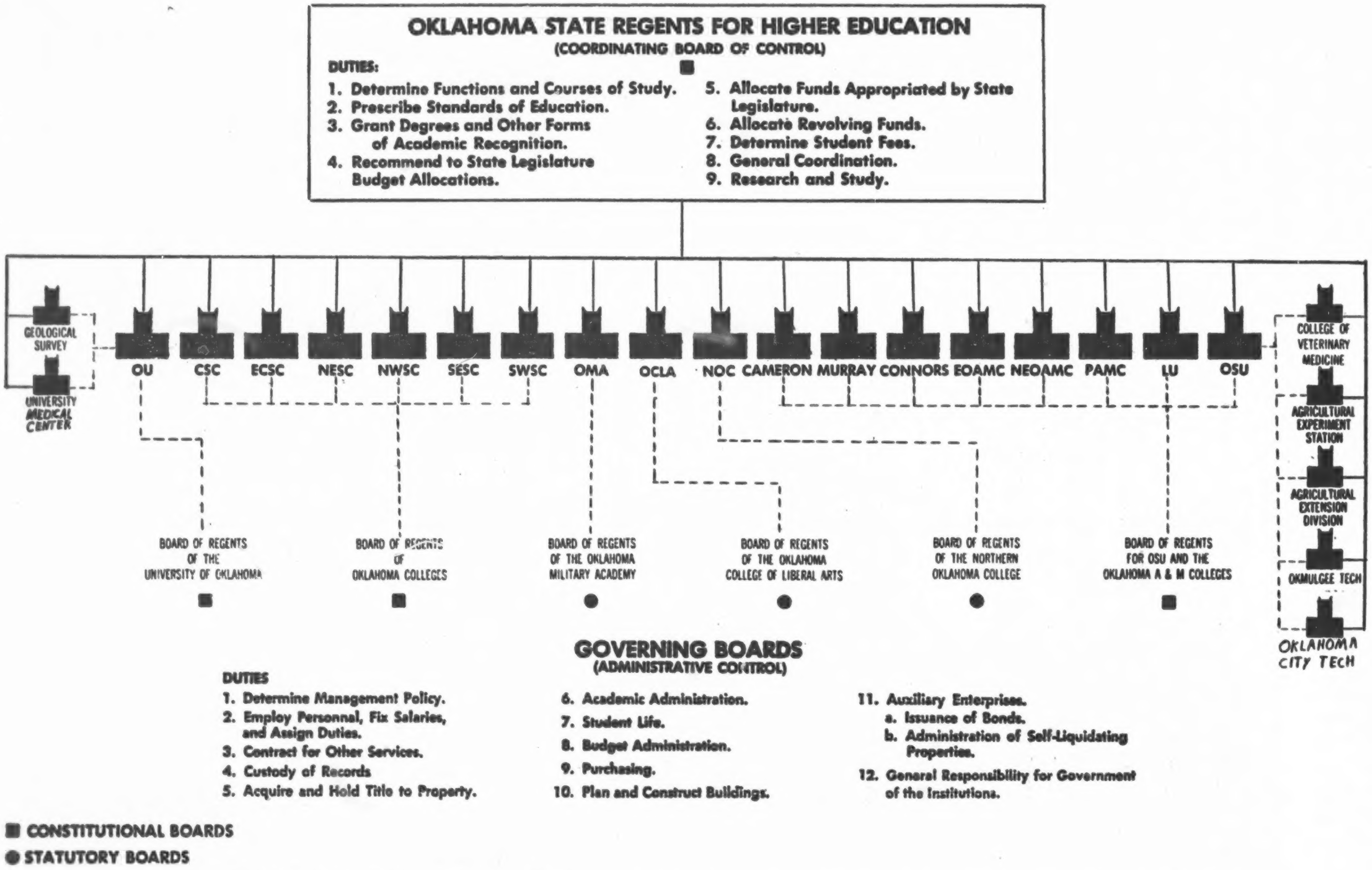
Figure 2 shows the institutions under the Oklahoma Regents for Higher Education which offer technical programs. Figure 3 shows the relationship of the Oklahoma State Regents for Higher Education to the higher education institutions in Oklahoma.



1. Sayre Junior College
   Sayre
2. Altus Junior College
   Altus
3. Cameron State College
   Lawton
4. O.S.U. Technical Institute, Oklahoma City
5. Murray State College
   Tishomingo
6. Eastern Oklahoma State College, Wilburton
7. Connors State College
   Warner
8. Oklahoma State Tech
   Okmulgee
9. Langston University
   Langston
10. O.S.U. Technical Institute, Stillwater
11. Northern State College
    Tonkawa
12. Northeastern Oklahoma A & M College, Miami

Figure 2. Active Post-High School Technical Program Locations: Fall 1967

THE OKLAHOMA STATE SYSTEM OF HIGHER EDUCATION



OKLAHOMA STATE REGENTS FOR HIGHER EDUCATION
(COORDINATING BOARD OF CONTROL) ■

DUTIES:
1. Determine Functions and Courses of Study.
2. Prescribe Standards of Education.
3. Grant Degrees and Other Forms of Academic Recognition.
4. Recommend to State Legislature Budget Allocations.
5. Allocate Funds Appropriated by State Legislature.
6. Allocate Revolving Funds.
7. Determine Student Fees.
8. General Coordination.
9. Research and Study.

GEOLOGICAL SURVEY
UNIVERSITY MEDICAL CENTER
OU
CSC
ECSC
NESC
NWSC
SESC
SWSC
OMA
OCLA
NOC
CAMERON
MURRAY
CONNORS
EOAMC
NEOAMC
PAMC
LU
OSU
COLLEGE OF VETERINARY MEDICINE
AGRICULTURAL EXPERIMENT STATION
AGRICULTURAL EXTENSION DIVISION
OKMULGEE TECH
OKLAHOMA CITY TECH
BOARD OF REGENTS OF THE UNIVERSITY OF OKLAHOMA ■
BOARD OF REGENTS OF OKLAHOMA COLLEGES ■
BOARD OF REGENTS OF THE OKLAHOMA MILITARY ACADEMY ●
BOARD OF REGENTS OF THE OKLAHOMA COLLEGE OF LIBERAL ARTS ●
BOARD OF REGENTS OF THE NORTHERN OKLAHOMA COLLEGE ●
BOARD OF REGENTS FOR OSU AND THE OKLAHOMA A & M COLLEGES ■

GOVERNING BOARDS
(ADMINISTRATIVE CONTROL)

DUTIES
1. Determine Management Policy.
2. Employ Personnel, Fix Salaries, and Assign Duties.
3. Contract for Other Services.
4. Custody of Records
5. Acquire and Hold Title to Property.
6. Academic Administration.
7. Student Life.
8. Budget Administration.
9. Purchasing.
10. Plan and Construct Buildings.
11. Auxiliary Enterprises.
    - a. Issuance of Bonds.
    - b. Administration of Self-Liquidating Properties.
12. General Responsibility for Government of the Institutions.

■ CONSTITUTIONAL BOARDS
● STATUTORY BOARDS

Figure 3. The Relationship Between the Oklahoma State Regents for Higher Education, and The State Universities and Colleges

The State Board of Education and State Department of Vocational-Technical Education

The State Board of Education[19] is composed of seven members, six of whom are appointed by the Governor for six year terms which expire on the first day of April, provided that the term of only one member expires in any year. The seventh member is the State Superintendent of Public Instruction, who is President and Executive Officer of the Board.

The State Board of Education has been designated by law as the State Department of Vocational-Technical Education and is the controlling Board for the following agencies:

A. Vocational Education

B. Vocational Rehabilitation

Figure 4 shows the organizational relationships between the State Board of Education and State Department of Vocational-Technical Education.

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[19] The Thirty-First Biennial Report of the State Department of Education of Oklahoma, (Oklahoma City, Oklahoma: State Board of Education of Oklahoma, 1966), p. 16.

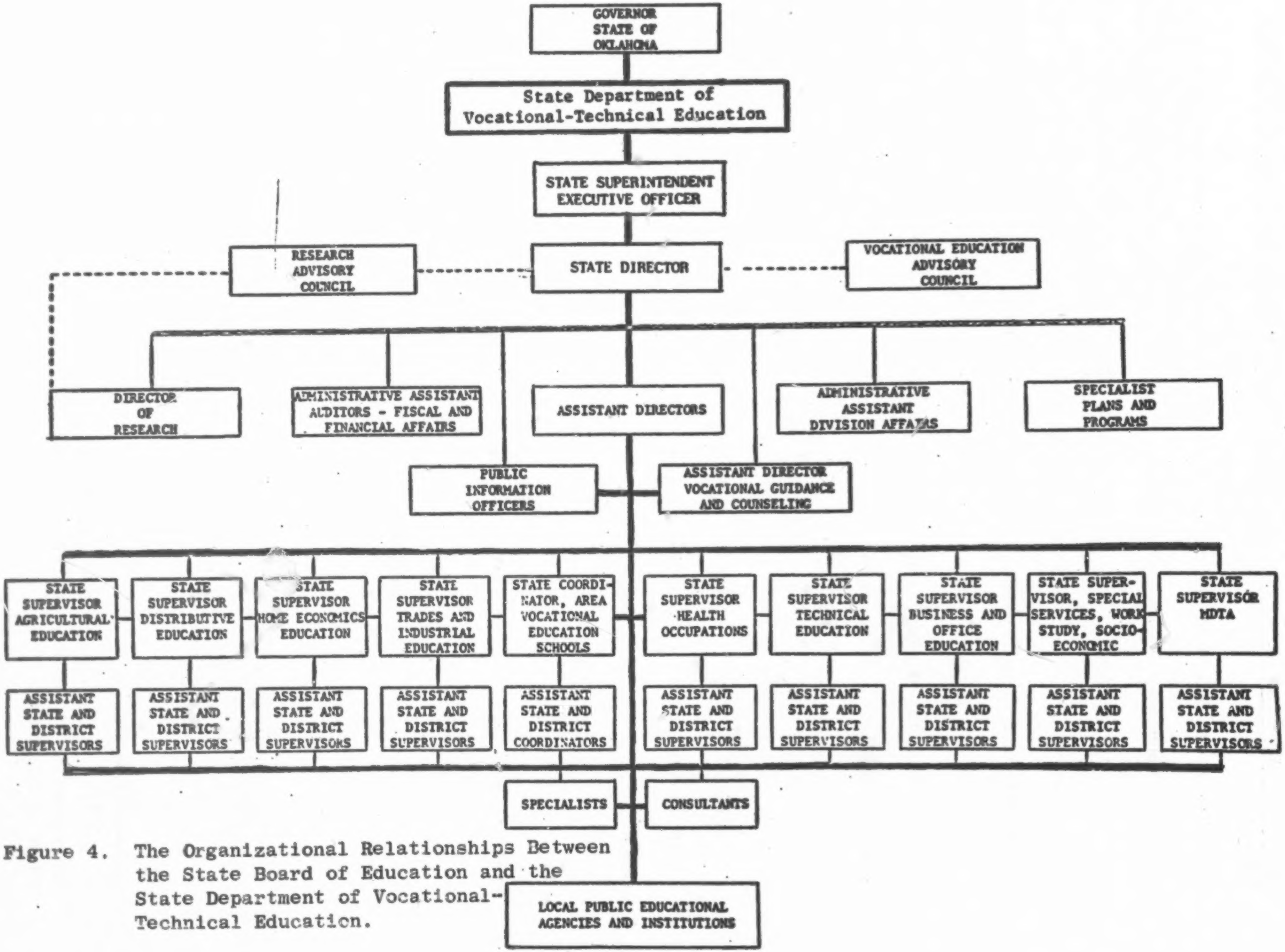

GOVERNOR STATE OF OKLAHOMA
State Department of Vocational-Technical Education
STATE SUPERINTENDENT EXECUTIVE OFFICER
RESEARCH ADVISORY COUNCIL
STATE DIRECTOR
VOCATIONAL EDUCATION ADVISORY COUNCIL
DIRECTOR OF RESEARCH
ADMINISTRATIVE ASSISTANT AUDITORS - FISCAL AND FINANCIAL AFFAIRS
ASSISTANT DIRECTORS
ADMINISTRATIVE ASSISTANT DIVISION AFFAIRS
SPECIALIST PLANS AND PROGRAMS
PUBLIC INFORMATION OFFICERS
ASSISTANT DIRECTOR VOCATIONAL GUIDANCE AND COUNSELING
STATE SUPERVISOR AGRICULTURAL EDUCATION
STATE SUPERVISOR DISTRIBUTIVE EDUCATION
STATE SUPERVISOR HOME ECONOMICS EDUCATION
STATE SUPERVISOR TRADES AND INDUSTRIAL EDUCATION
STATE COORDINATOR, AREA VOCATIONAL EDUCATION SCHOOLS
STATE SUPERVISOR HEALTH OCCUPATIONS
STATE SUPERVISOR TECHNICAL EDUCATION
STATE SUPERVISOR BUSINESS AND OFFICE EDUCATION
STATE SUPERVISOR, SPECIAL SERVICES, WORK STUDY, SOCIO-ECONOMIC
STATE SUPERVISOR MDTA
ASSISTANT STATE AND DISTRICT SUPERVISORS
ASSISTANT STATE AND DISTRICT SUPERVISORS
ASSISTANT STATE AND DISTRICT SUPERVISORS
ASSISTANT STATE AND DISTRICT SUPERVISORS
ASSISTANT STATE AND DISTRICT COORDINATORS
ASSISTANT STATE AND DISTRICT SUPERVISORS
ASSISTANT STATE AND DISTRICT SUPERVISORS
ASSISTANT STATE AND DISTRICT SUPERVISORS
ASSISTANT STATE AND DISTRICT SUPERVISORS
ASSISTANT STATE AND DISTRICT SUPERVISORS
SPECIALISTS
CONSULTANTS
LOCAL PUBLIC EDUCATIONAL AGENCIES AND INSTITUTIONS

Figure 4. The Organizational Relationships Between the State Board of Education and the State Department of Vocational-Technical Education.

In conclusion: All of the aforementioned state-supported institutions presently have some type of terminal, technical-vocational training with the exception of Oklahoma College of Liberal Arts, Oklahoma Military Academy, Northeastern State College, and Southeastern State College. This established tradition of offering post-high school occupational programs within the framework of higher education in Oklahoma must be considered in viewing the problems of statewide coordination. Several independent colleges are involved in business associate degree or certificate programs, with Bacone College offering the associate nursing degree. Oklahoma College of Liberal Arts deleted at least one technology program in the fall of 1967 and Poteau Community College has cancelled two technology programs in the recent past.

The State Regents for Higher Education was examined in this chapter since Article XIII-A Section One of the Constitution of Oklahoma states that: "All institutions of higher education supported wholly or in part by direct legislative appropriations shall be integral parts of a unified system to be known as the Oklahoma System of Higher Education." The State Board of Education in Oklahoma is designated by law as the State Department of Vocational-Technical Education.

CHAPTER IV

OKLAHOMA'S PRESENT OCCUPATIONAL PROGRAMS AT THE POST-HIGH SCHOOL LEVEL

In this chapter the technical, business, paramedical, and some skill oriented post-high school occupational programs are reviewed with attention given to the demand for graduates of these programs in Oklahoma. The Oklahoma Employment Security Commission is in the process of publishing a preliminary report on the demand for various levels of manpower in Oklahoma. However, only the northeast and northwest section of the state's manpower needs have been received at the time of this writing. Data on manpower demand, therefore, will be primarily from the OESC manpower report of 1964.

Post-High School Technical Education

Technical education programs constitute the largest sector of Oklahoma's public supported post-high school programs having clearly identified occupational objectives of less than baccalaureate level. For classification purposes, technical education has been defined as two year full-time technology programs of the associate degree level. All programs included in this grouping are college credit programs with the exception of those offered by the Oklahoma State University School of Technical Training at Okmulgee. Only four of the 38 programs offered there are classified as technical in this study: Drafting, industrial electronics, air conditioning-refrigeration, and data processing technology.

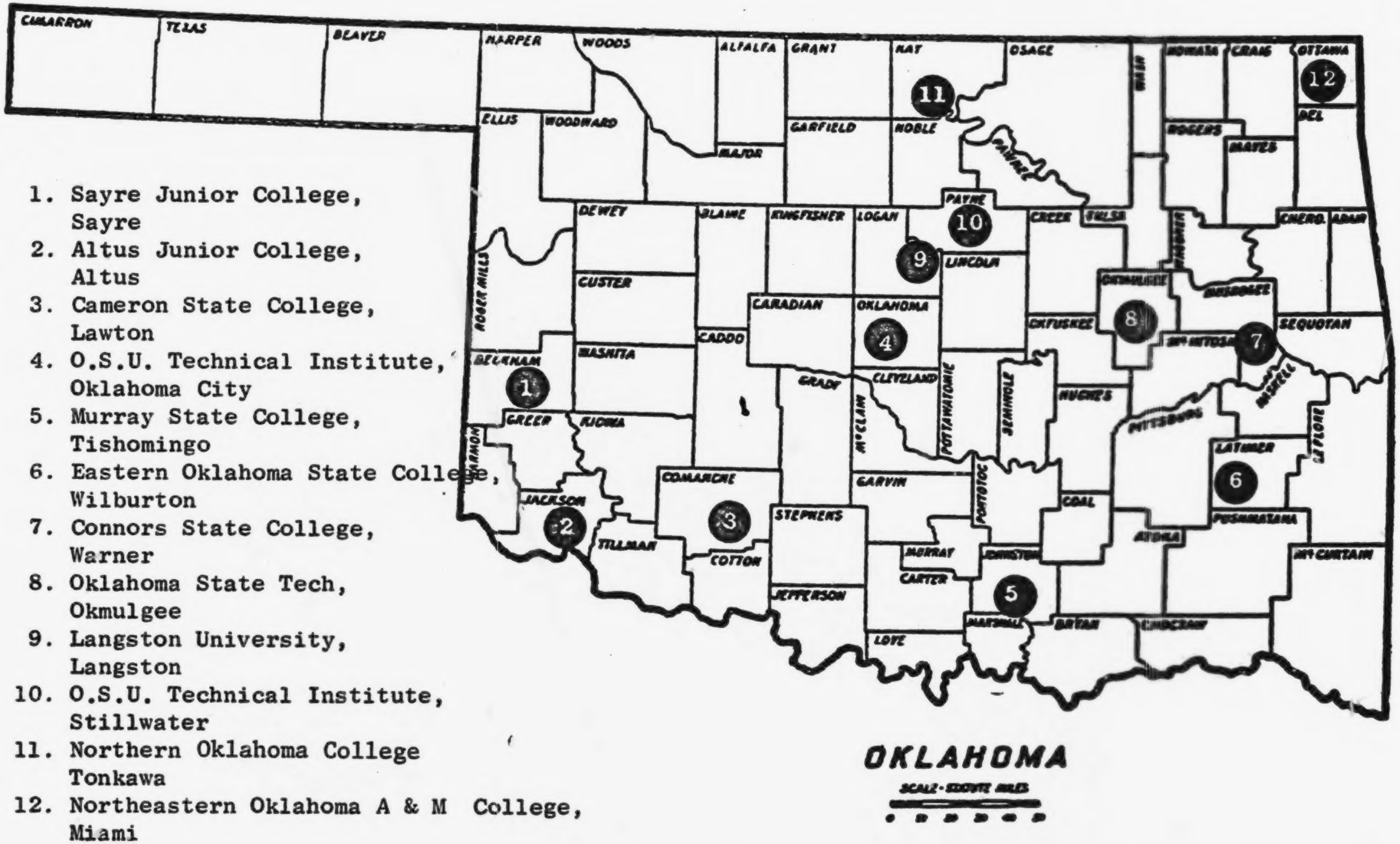
Part-time enrollments in technical areas include only those persons enrolled in courses that are included in the full-time associate degree level programs. Short-term, specialized adult education courses such as those offered through the Manpower Development and Training Act and area vocational-technical schools are treated separately. College credit courses offered by the Oklahoma State Technical Institute through the university extension service are treated as part-time enrollments.

Types of Institutions

Oklahoma has a mix of institutional types which provide two year technical programs. Figure 5 shows the institutions in Oklahoma with presently active technical programs. The institutional types fall into the following categories: Eight junior colleges; two technical institutes; Oklahoma State University School of Technical Training at Okmulgee; Langston University; and one four year college. Oklahoma College of Liberal Arts at Chickasha, a four year college, has a medical technology program which has produced one graduate. Enrollees and this single graduate are included in the data to follow, but the medical technology program is not included in Figure 5 and Tables 5, 6, and 8 because of the single graduate and the concentration in this section on engineering and physical science related technologies.

Types of Programs

Oklahoma has had long experience in the development and operation of technical programs. Oklahoma State University Technical Institute at Stillwater dates back to 1937 and is one of the pioneers in technical institute education. The active programs offered by the Oklahoma institutions participating in two year technical education are shown in Table 5.


CIMARRON
TEXAS
BEAVER
HARPER
WOODS
ALFALFA
GRANT
KAY
OSAGE
NOWATA
CRAIG
OTTAWA
ELLIS
WOODWARD
MAJOR
GARFIELD
NOBLE
PAWNEE
ROGERS
MAYES
DEL
DEWEY
BLAINE
KINGFISHER
LOGAN
PAYNE
CREEK
TULSA
CHERO.
ADAIR
ROGER MILLS
CUSTER
CADDO
CARADIAN
OKLAHOMA
LINCOLN
OKMULGEE
OKFUSKEE
MUSKOGEE
SEQUOYAH
BECKHAM
WASHITA
GRADY
CLEVELAND
McCLAIN
POTTAWATOMIE
SEMINOLE
HUGHES
McINTOSH
HASKELL
LEFLORE
PITTSBURG
HARMON
GREER
KIOWA
JACKSON
TILLMAN
COMANCHE
COTTON
STEPHENS
JEFFERSON
GARVIN
PONTOTOC
COAL
LATIMER
MURRAY
CARTER
JOHNSTON
MARSHALL
LOVE
ATOKA
PUSHMATAHA
BRYAN
CHOCTAW
McCURTAIN
1
2
3
4
5
6
7
8
9
10
11
12
OKLAHOMA
SCALE · STATUTE MILES

1. Sayre Junior College, Sayre
2. Altus Junior College, Altus
3. Cameron State College, Lawton
4. O.S.U. Technical Institute, Oklahoma City
5. Murray State College, Tishomingo
6. Eastern Oklahoma State College, Wilburton
7. Connors State College, Warner
8. Oklahoma State Tech, Okmulgee
9. Langston University, Langston
10. O.S.U. Technical Institute, Stillwater
11. Northern Oklahoma College Tonkawa
12. Northeastern Oklahoma A & M College, Miami

Figure 5 . Active Post-High School Technical Program Locations: Fall 1966

The programs are as follows: Nine electronics; eight drafting; seven data processing; three refrigeration and heating; two mechanical; two chemical; and one each of aeronautical, civil, civil and highway, construction, fire protection, instrumentation and process control, metals, petroleum, and radiation.

The widest variety of technical programs is found at Oklahoma State University Technical Institute at Stillwater. Programs unique to that institution are aeronautical, construction, fire protection, metals, petroleum, and radiation technologies. Oklahoma State University Technical Institute, Oklahoma City Branch, offers the only instrumentation and process control technology program in the state. Civil technology is available only at the Oklahoma State University Technical Institute, Oklahoma City Branch, and civil and highway technology only at Eastern Oklahoma State College at Wilburton.

Looking again at Table 5, it can be seen that the two Oklahoma State University Technical Institutes at Stillwater and Oklahoma City and Oklahoma State University School of Technical Training at Okmulgee accounted for 19 of the 40 technical programs, or 50 per cent, with Langston University accounting for 1, or 2.5 per cent.

Enrollments and Graduates in Post-High School Technical Programs in Oklahoma

Graduates in post-high school technical programs have been concentrated in electronics, drafting, and mechanical technologies as shown in Table 6. Data processing has developed rapidly in the last four years and presently boasts a combined full- and part-time enrollment roughly equal to the most popular programs--electronics, drafting, and mechanical technology.

TABLE 5

ACTIVE POST-HIGH SCHOOL TECHNICAL PROGRAMS IN OKLAHOMA, FALL 1966

SCHOOL OFFERING POST-HIGH SCHOOL TECHNICAL PROGRAM	PROGRAMS															
	Aeronautical	Chemical	Civil	Civil & Highway	Construction	Data Processing	Drafting	Electronics	Fire Protection	Instrumentation & Process Control	Mechanical	Metals	Petroleum	Radiation	Refrigeration & Heating	TOTAL
Altus Junior College						X										1
Cameron State College						X	X	X								3
Connors State College							X									1
Eastern Oklahoma State College		X		X		X	X	X								5
Langston University								X								1
Murray State College							X									1
Northeastern Oklahoma A & M College		X				X	X	X			X				X	6
Northern Oklahoma College						X		X								2
Oklahoma State Tech						X	X	X							X	4
OSU Technical Institute, Okla. City			X			X	X	X		X					X	6
OSU Technical Institute, Stillwater	X				X		X	X	X		X	X	X	X		9
Sayre Junior College								X								1
TOTAL	1	2	1	1	1	7	8	9	1	1	2	1	1	1	3	40

The full-time enrollments in fall 1966 totaled 1,908 as shown in Figure 6. The Oklahoma State University Technical Institutes and Oklahoma State Tech at Okmulgee had 1,313 of the 1,908 enrollees, or 68.8 per cent. The eight junior colleges had 548, or 28.7 per cent of the total. Four year schools had 47, or 2.5 per cent of the total.

There were 431 graduates of Oklahoma's technical programs in 1967. The Oklahoma State University Technical Institutes at Stillwater and Oklahoma City and Oklahoma State Tech at Okmulgee graduated 268 of the 431 graduates, or 62.2 per cent. The junior colleges graduated 159, or 36.9 per cent. Four year schools graduated 4, or 1 per cent of the total.

The part-time enrollment in fall 1966, as shown in Figure 7, is distributed similar to full-time enrollment, with junior colleges accounting for 393 of the 1,024, or 38.4 per cent of the total. The Oklahoma State University Technical Institutes at Stillwater and Oklahoma City and Oklahoma State Tech at Okmulgee account for 631, or 61.6 per cent of the total. The four year schools at Langston and Chickasha list no part-time enrollments for any year. The Oklahoma State University Technical Institute at Stillwater does not report any part-time enrollment on the campus, but maintains a substantial extension service, serving 218 adults in technical extension courses during the fall of 1966.

The part-time portion of the total enrollment picture has steadily increased in the 1960's, as shown in Figure 8. In the school year 1960-1961 part-time enrollments comprised only 9.5 per cent of the total enrollment. By the 1966-1967 school year, however, it had increased to roughly one-third (34.9 per cent) of the total enrollment. The increase in part-time enrollments in Oklahoma's technical programs is a healthy sign. With rapid technological change as a way of life today, a large

TABLE 6

GRADUATES OF OKLAHOMA TECHNICAL PROGRAMS FOR THE SCHOOL YEARS 1960-61 TO 1966-67

	Aeronautical	Chemical	Civil	Construction	Data Processing	Drafting	Electrical	Electronics	Fire Protection	Instrumentation & Process Control	Mechanical, Ref. & Heating	Metals	Radiation	Total
1960-61	14	0	0	5	0	68	16	72	12	0	87	8	0	282
1961-62	10	0	0	13	0	67	9	79	19	0	55	0	0	252
1962-63	11	3	0	10	0	89	7	97	12	0	50	6	0	285
1963-64	16	8	0	11	14	96	4	99	12	0	112	7	0	379
1964-65	8	21	2	5	19	160	8	116	13	0	105	0	0	457
1965-66	9	18	1	5	34	141	8	116	12	3	107	7	11	472
1966-67	9	10	4	2	37	134	0	121	9	3	86	4	11	430
Total	77	60	7	51	104	755	52	700	89	6	602	32	22	2557

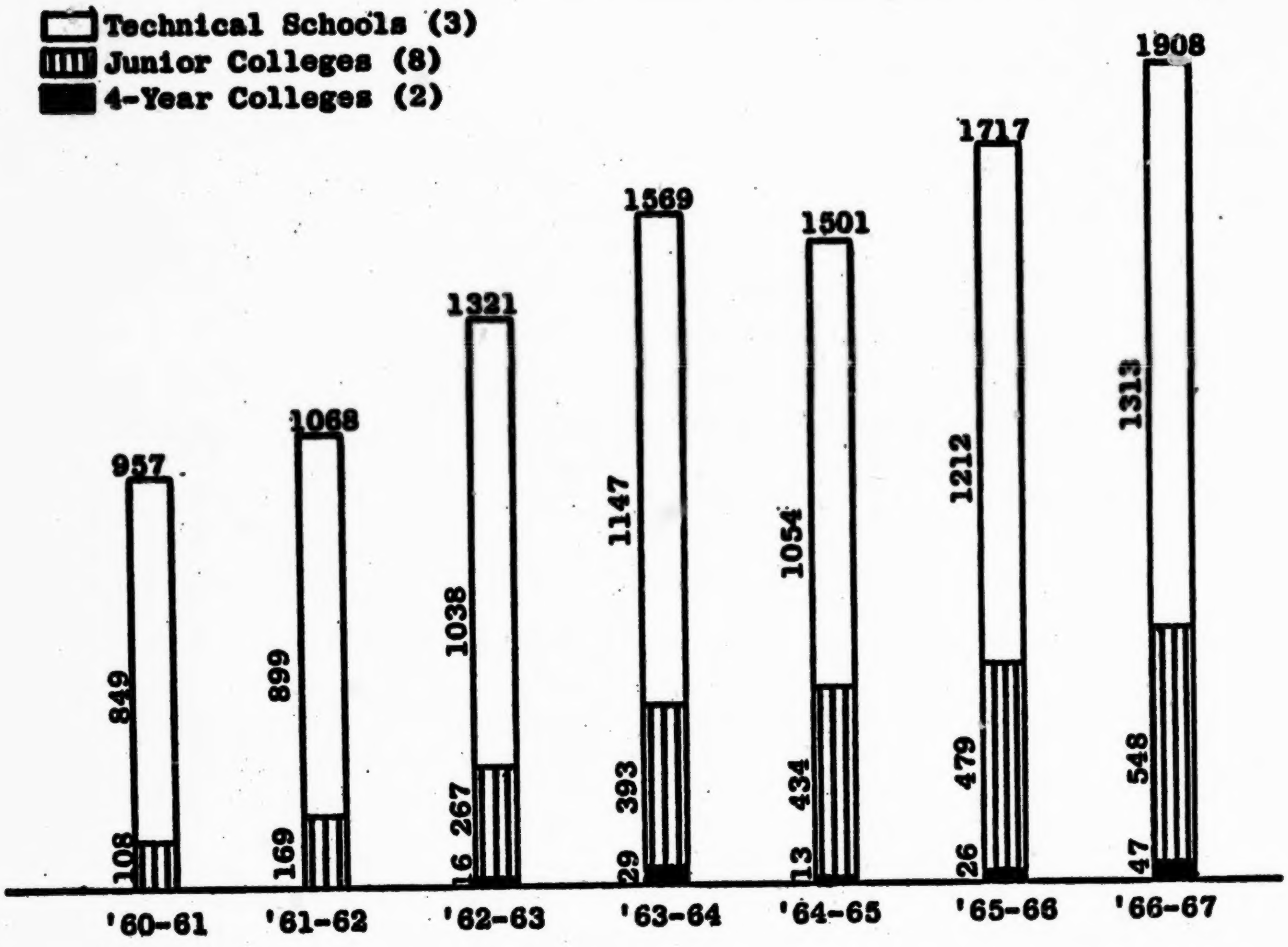


Figure 6 . Full Time Post-High School Technical Program Enrollments In Oklahoma from 1960-61 to '66-67

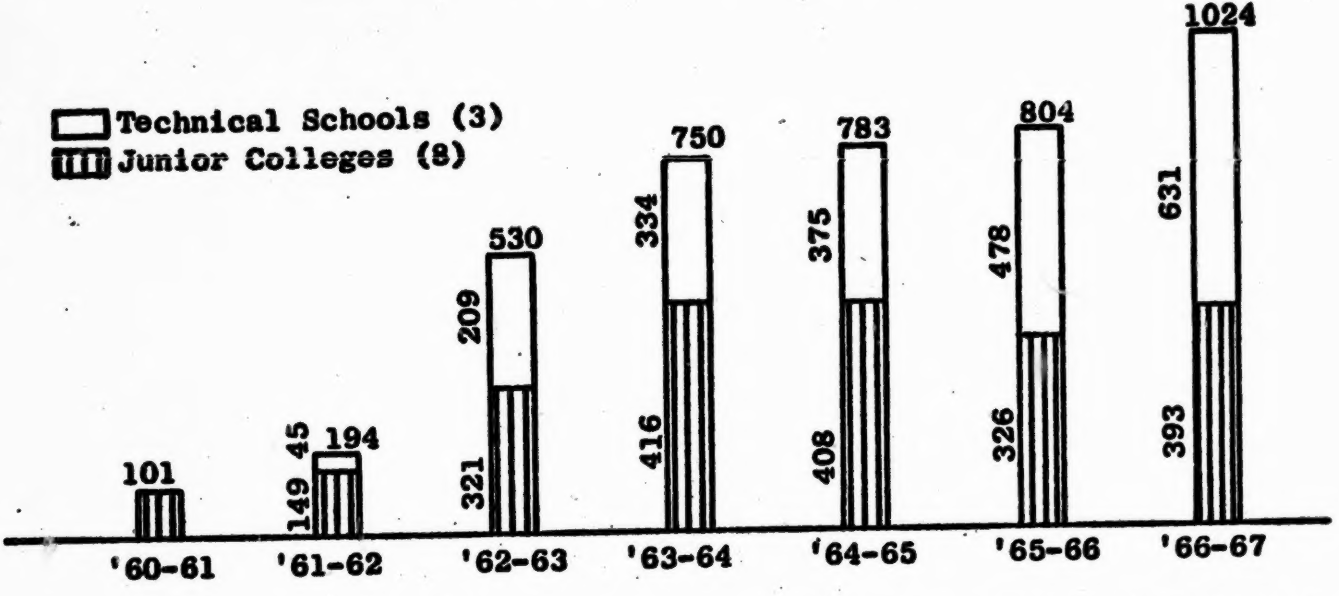


Figure 7 . Part Time Post-High School Technical Program Enrollments In Oklahoma from 1960-61 to '66-67 segment of our labor force must maintain their technical competencies through part-time enrollment in post-high school technical programs.

The part-time enrollments in Oklahoma's technical programs will probably continue to grow in relation to full-time enrollments. According to a U.S. Office of Education progress report,[20] national part-time enrollments in technical programs in 1964 accounted for 58.2 per cent of the total enrollment.

Some part-time adult enrollments in area vocational-technical schools are relevant to this study. Table 7 shows the adult education part-time enrollments for the 1966-1967 school year. The total part-time adult enrollments of 255 for the 1966-1967 school year is a considerable addition to the constantly increasing enrollments of this type in Oklahoma.

Part-time and full-time enrollments did not increase at their previous rate during the 1964-1965 school year. This may have accounted for the lack of increase in technical graduates in 1966-1967, as shown in Figure 9.

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[20] U.S., Office of Education, Progress in Technical Vocation Education Programs Under Title III of the George-Barden Act, Division of Vocational and Technical Education, (Washington: June, 1965), p. 1.

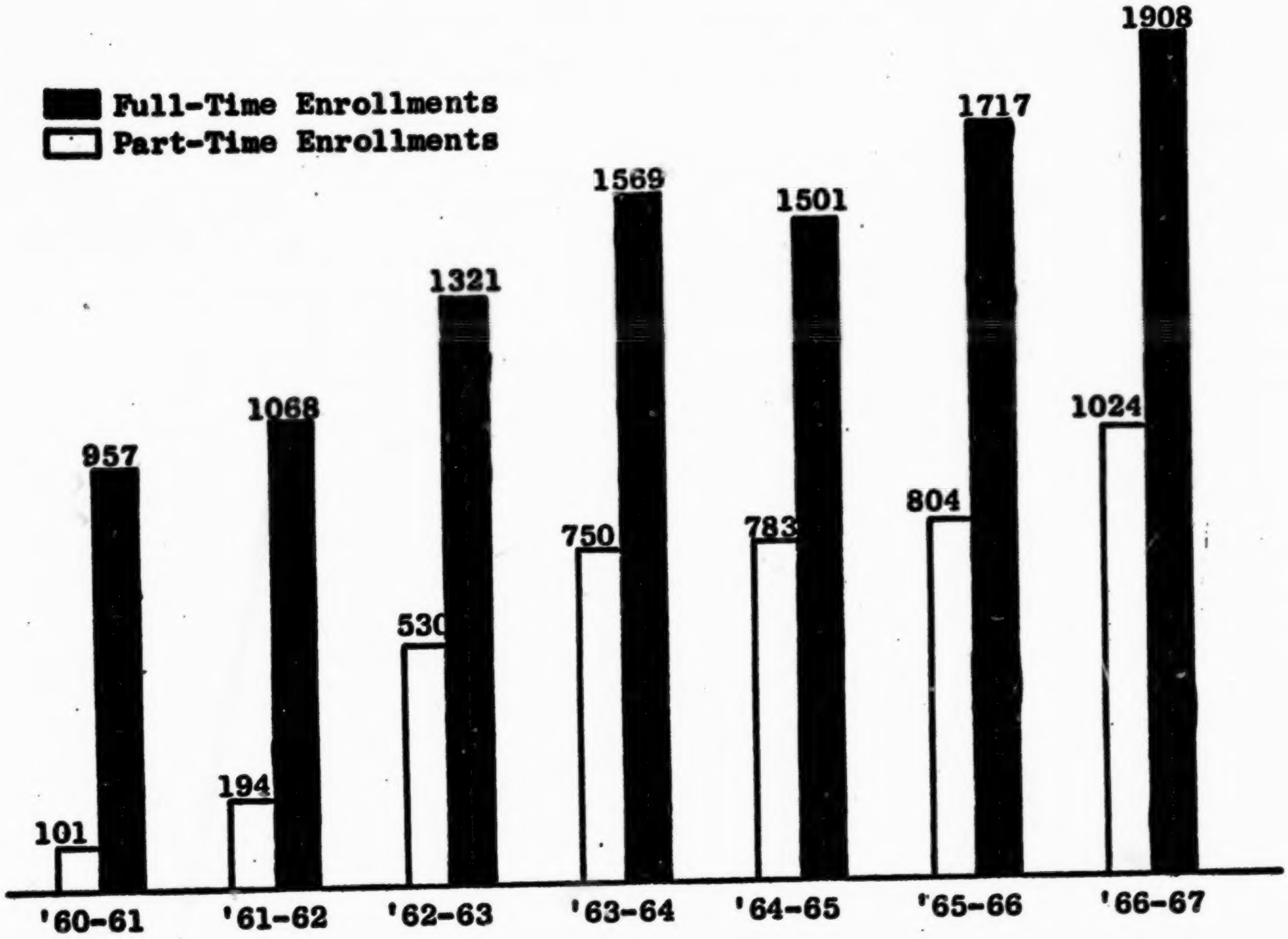

Figure 8 . A Comparison of Full and Part Time Post-High School Technical Program Enrollments in Oklahoma from 1960-61 to '66-67

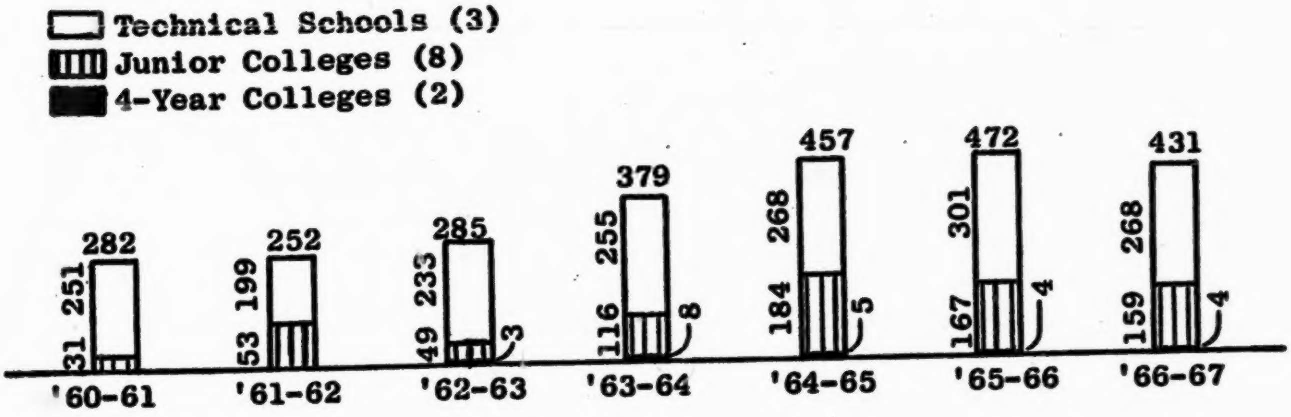

Figure 9 . Yearly Post-High School Technical Program Graduates in Oklahoma from 1960-61 to '66-67

TABLE 7

TECHNICAL-RELATED ADULT EDUCATION ENROLLMENTS 1966-1967
AREA VOCATIONAL-TECHNICAL SCHOOLS

Ardmore		
	Computer Programming	14
	Descriptive Geometry	9
	Drafting	33
	Electronics	64
	Total	120
Duncan		
	Industrial Chemistry	15
Oklahoma City		
	Data Processing	26
	Drafting	6
	Electronics	21
	Machine Operations	14
	Total	67
Tulsa		
	Computer Programming	18
	Data Processing	35
	Total	53
	Grand Total	255

Source: State Board for Vocational Education.

Present Enrollment Capacities of Post-High School Technical Programs in Oklahoma

The full-time enrollments and graduates in Oklahoma's technical programs for the 1966-1967 school year were 1,908 and 431, respectively. This full-time enrollment picture can be compared to the full-time enrollment potential by viewing vacancies in existing programs.

A questionnaire was sent to all institutions presently offering two year, full-time associate degree level technical programs. Table 8 shows the reported student handling capacities or potential enrollments of these institutions. The responses indicate that the 1,908 full-time enrollments in the 1966-1967 school year could be 3,703 before current

TABLE 8

POTENTIAL ENROLLMENT CAPACITY OF POST-HIGH SCHOOL INSTITUTIONS PRESENTLY OFFERING TECHNICAL PROGRAMS WITH EXISTING SPACE

SCHOOL OFFERING POST-HIGH SCHOOL TECHNICAL PROGRAM / PROGRAMS	Aeronautical	Chemical	Civil	Civil & Highway	Construction	Data Processing	Drafting	Electronics	Fire Protection	Instrumentation & Process Control	Mechanical	Metals	Petroleum	Radiation	Refrigeration & Heating	TOTALS
Altus Junior College						30*										30
Cameron State College						65	80	45								190
Connors State College							100	100								200
Eastern Oklahoma State College		25		25		75	50	60								235
Langston University								40*								40
Murray State College							60									60
Northeastern Oklahoma A & M College		50				150	80	80			100					460
Northern Oklahoma College						75		48								123
Oklahoma State Tech						200	352	356							350	1,258
OSU Technical Institute, Okla. City			50			100	100	100		50						400
OSU Technical Institute, Stillwater	60				72		80	80	80		80	60	80	80		672
Sayre Junior College								35								35
TOTALS	60	75	50	25	72	695	902	944	80	50	180	60	80	80	350	3,703

* These numbers are estimates.

Source: Questionnaire sent in August 1967 to institutions offering technical programs.

student handling capacities are fully utilized. This represents a potential increase of 1,795 full-time enrollments, or 91.4 per cent.

The Distribution of Technical Programs

The distribution of technical programs and enrollments can be viewed from several different geographic area concepts. Several possible divisions by geographic areas might include division by state economic areas, by vocational-technical school districts, or by economic development districts. Each of the above area concepts divides Oklahoma, or parts thereof, into geographic areas which are significant for certain purposes. It is important to look at each separately.

Technical Programs and Enrollments by State Economic Areas

State economic areas were used in the 1960 U.S. Census to account for industrial, commercial, demographic, climatic, physiographic, and cultural factors in the state, region, and nation. Figure 10 shows the post-high school institutions offering technical programs within each of these areas. The U.S. Census Bureau defines state economic areas as follows:

> SEA's are relatively homogeneous subdivisions of states. They consist of single counties or groups of counties which have similar economic and social characteristics. The boundaries of these areas have been drawn in such a way that each state is subdivided into relatively few parts, with each part having certain significant characteristics which distinguishes it from adjoining areas.[21]

A few state economic areas contain no state-supported institutions offering technical programs. Notable among these is the Tulsa area

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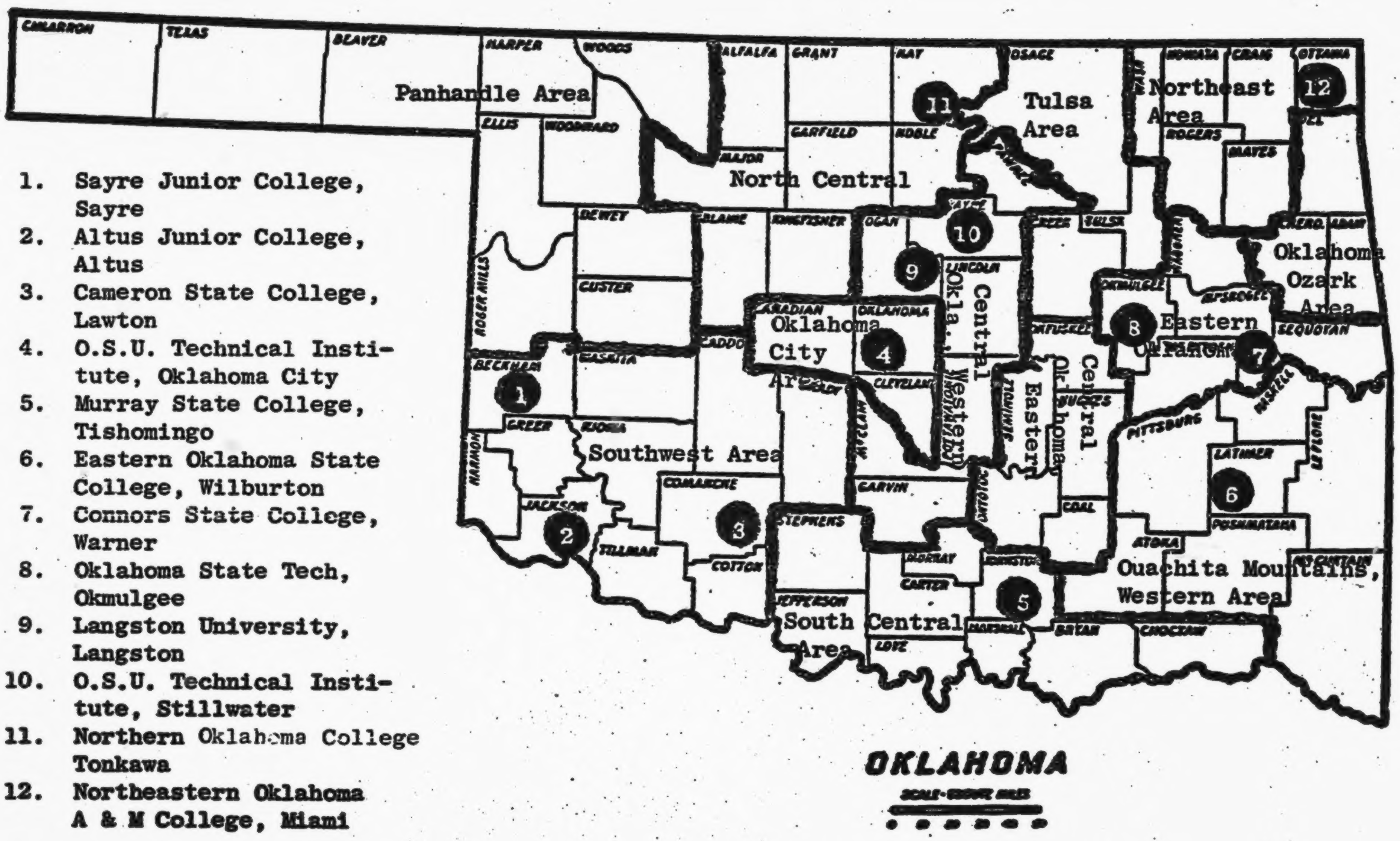
[21] U.S. Bureau of the Census, U.S. Census of Population, 1960, Selected Area Reports, State Economic Areas (Washington: U.S. Government Printing Office, 1963), p. ix.


Panhandle Area
North Central
Tulsa Area
Northeast Area
Oklahoma Ozark Area
Eastern Oklahoma
Central Okla.
Western
Central Oklahoma Eastern
Oklahoma City Area
Southwest Area
South Central Area
Ouachita Mountains, Western Area
CIMARRON
TEXAS
BEAVER
HARPER
WOODS
ALFALFA
GRANT
KAY
OSAGE
NOWATA
CRAIG
OTTAWA
ELLIS
WOODWARD
MAJOR
GARFIELD
NOBLE
PAWNEE
ROGERS
MAYES
DEWEY
BLAINE
KINGFISHER
LOGAN
PAYNE
CREEK
TULSA
WAGONER
CHEROKEE
ADAIR
ROGER MILLS
CUSTER
CADDO
CANADIAN
OKLAHOMA
LINCOLN
OKFUSKEE
OKMULGEE
MUSKOGEE
SEQUOYAH
BECKHAM
WASHITA
CLEVELAND
McINTOSH
HASKELL
LE FLORE
GREER
KIOWA
HARMON
JACKSON
GRADY
McCLAIN
POTTAWATOMIE
SEMINOLE
HUGHES
PITTSBURG
LATIMER
COMANCHE
TILLMAN
COTTON
STEPHENS
GARVIN
PONTOTOC
COAL
ATOKA
PUSHMATAHA
McCURTAIN
JEFFERSON
MURRAY
CARTER
JOHNSTON
LOVE
MARSHALL
BRYAN
CHOCTAW
1
2
3
4
5
6
7
8
9
10
11
12
OKLAHOMA

1. Sayre Junior College, Sayre
2. Altus Junior College, Altus
3. Cameron State College, Lawton
4. O.S.U. Technical Institute, Oklahoma City
5. Murray State College, Tishomingo
6. Eastern Oklahoma State College, Wilburton
7. Connors State College, Warner
8. Oklahoma State Tech, Okmulgee
9. Langston University, Langston
10. O.S.U. Technical Institute, Stillwater
11. Northern Oklahoma College Tonkawa
12. Northeastern Oklahoma A & M College, Miami

Figure 10 Post-High School Institutions Offering Technical Programs —By Census Economic Area

where much of the state's population and industry is concentrated. Post-high school technical programs by state economic areas are shown in Table 9.

Enrollments and Programs by Area Vocational-Technical School Districts

Area vocational-technical schools essentially represent an attempt to provide better vocational and technical education than could be provided by local high schools which might be too small or too limited in special facilities. Area schools are characterized in a recent report of the American Vocational Association as: "....training which leads to employment, upgrading, and updating in specific occupations, and they serve students from more than one community or school district."[22]

Passage of State Question 434 in 1966 provided a legal basis for Oklahoma school districts to join together in providing area schools. It also gave the State Board for Vocational Education authority to formulate definite criteria for the establishment of area vocational-technical school districts. The present criteria of a minimum of $40,000,000 net valuation and 15,000 enumeration of school districts in the area is designed to guarantee adequate enrollment and a sound basis for financing area schools.

A comparison of locations of post-high school technical programs and area vocational-technical schools is shown in Figure 11. Five area vocational-technical schools are now operational with another five

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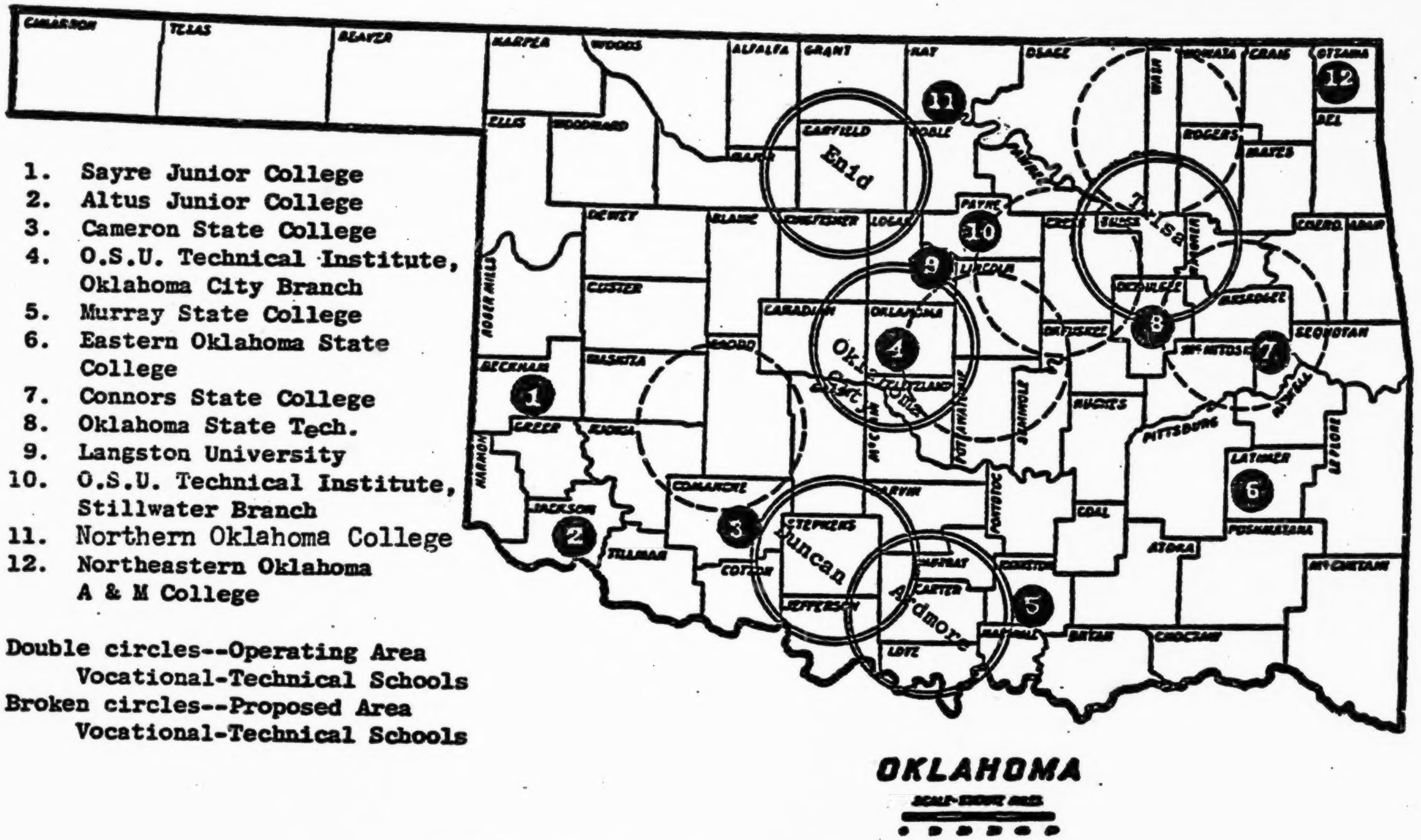
[22] Area Vocational Education Programs, American Vocational Association, (Washington: The Association, 1966), p. 4.

TABLE 9

POST-HIGH SCHOOL TECHNICAL PROGRAMS OFFERED IN '65-66 OR '66-67 --BY CENSUS ECONOMIC AREAS

	PROGRAMS														
CENSUS ECONOMIC AREAS (refer to map, figure 10.)	Aeronautical	Chemical	Civil	Civil & Highway	Construction	Data Processing	Drafting	Electronics	Fire Protection	Instrumentation & Process Control	Mechanical	Metals	Petroleum	Radiation	Refrigeration & Heating
Panhandle															
North Central						1		1							
Northeast		1				1	1	1			1				1
Southwest						2	1	2							
Central Oklahoma--Western	1				1		1	2	1		1	1	1	1	1
Central Oklahoma--Eastern															
South Central							1								
Eastern Oklahoma						1	2	1							1
Ouachita Mountains--Western		1		1		1	1	1							
Oklahoma Ozark															
Tulsa Area															
Oklahoma City Area			1			1	1	1		1					1


CIMARRON
TEXAS
BEAVER
HARPER
WOODS
ALFALFA
GRANT
KAY
OSAGE
NOWATA
CRAIG
OTTAWA
ELLIS
WOODWARD
MAJOR
GARFIELD
NOBLE
PAWNEE
ROGERS
MAYES
DELAWARE
DEWEY
BLAINE
KINGFISHER
LOGAN
PAYNE
CREEK
TULSA
WAGONER
CHEROKEE
ADAIR
ROGER MILLS
CUSTER
LINCOLN
CANADIAN
OKLAHOMA
OKMULGEE
MUSKOGEE
CADDO
OKFUSKEE
McINTOSH
SEQUOYAH
WASHITA
BECKHAM
CLEVELAND
McCLAIN
POTTAWATOMIE
SEMINOLE
HUGHES
HASKELL
PITTSBURG
LE FLORE
GREER
KIOWA
HARMON
LATIMER
COMANCHE
GARVIN
PONTOTOC
COAL
JACKSON
TILLMAN
STEPHENS
MURRAY
JOHNSTON
ATOKA
PUSHMATAHA
COTTON
CARTER
JEFFERSON
MARSHALL
BRYAN
CHOCTAW
McCURTAIN
LOVE
Enid
Tulsa
Oklahoma City
Duncan
Ardmore
1
2
3
4
5
6
7
8
9
10
11
12
OKLAHOMA

1. Sayre Junior College
2. Altus Junior College
3. Cameron State College
4. O.S.U. Technical Institute, Oklahoma City Branch
5. Murray State College
6. Eastern Oklahoma State College
7. Connors State College
8. Oklahoma State Tech.
9. Langston University
10. O.S.U. Technical Institute, Stillwater Branch
11. Northern Oklahoma College
12. Northeastern Oklahoma A & M College

Double circles--Operating Area
Vocational-Technical Schools
Broken circles--Proposed Area
Vocational-Technical Schools

Figure 11 Comparison of Locations of Post-High School Technical Programs and Area Vocational-Technical Schools

districts in various stages of planning.* The operational and proposed school districts seem to cover the primary population areas of Oklahoma.

It should be remembered that the area concept is not limited to the present area vocational-technical school districts in Oklahoma. As defined by the Vocational Education Act of 1963, an area program may be:

1. A specialized high school used exclusively, or almost so, to provide full-time vocational education in preparation for full-time work in industry.
2. A department of high school used exclusively or principally to provide training in at least five different occupational fields to students available for full-time study prior to entering the labor market.
3. A technical or vocational school providing vocational education predominantly to persons who have completed or left school and who are able to study on a full-time basis before going to work.
4. A department or division of a junior college, community college, or university providing vocational education in at least five different occupational fields, under the supervision of the State Board of Vocational Education, and leading to immediate employment but not toward a baccalaureate degree.[23]

Area vocational programs were first conceived as educational services for individuals still in the compulsory school age bracket. Upgrading, updating, and initial skill training of older workers, however, seems particularly well suited to area programs.

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* The five area vocational-technical schools which will be operational this fall are administered by single school districts.

[23] American Vocational Association, Area Vocational Education Programs, (Washington: 1966), pp. 4-5.

Enrollments and Programs by Economic Development Districts

There are five multicounty economic development districts in operation in the Oklahoma Ozarka region. The districts are considered to be basic implementing units in the overall economic development program for portions of Oklahoma. According to a recent publication of the Oklahoma Industrial Development and Parks Department, the Economic Development Districts function as "the basic, local, project-implementing agency."[24]

Figure 12 shows the post-high school technical institutions offering technical programs within each economic development district. The districts are restricted to the eastern half of Oklahoma since they were generated out of the total planning for the Ozarka area. Within the five districts, six post-high school institutions offering technical programs account for 27 programs, or 65.83 per cent of the total programs offered in all such institutions in Oklahoma. The Oklahoma State University Technical Institute at Stillwater, which is in the Central Oklahoma Economic Development District, accounts for 10 of the 27 programs in the five economic development districts.

The district directors are concerned with vocational-technical education as a part of their total economic development effort. At least two recent conferences attended by the economic development district directors have given prime attention to this subject.

In conclusion: Technical education programs constitute the largest sector of Oklahoma's public supported post-high school programs having

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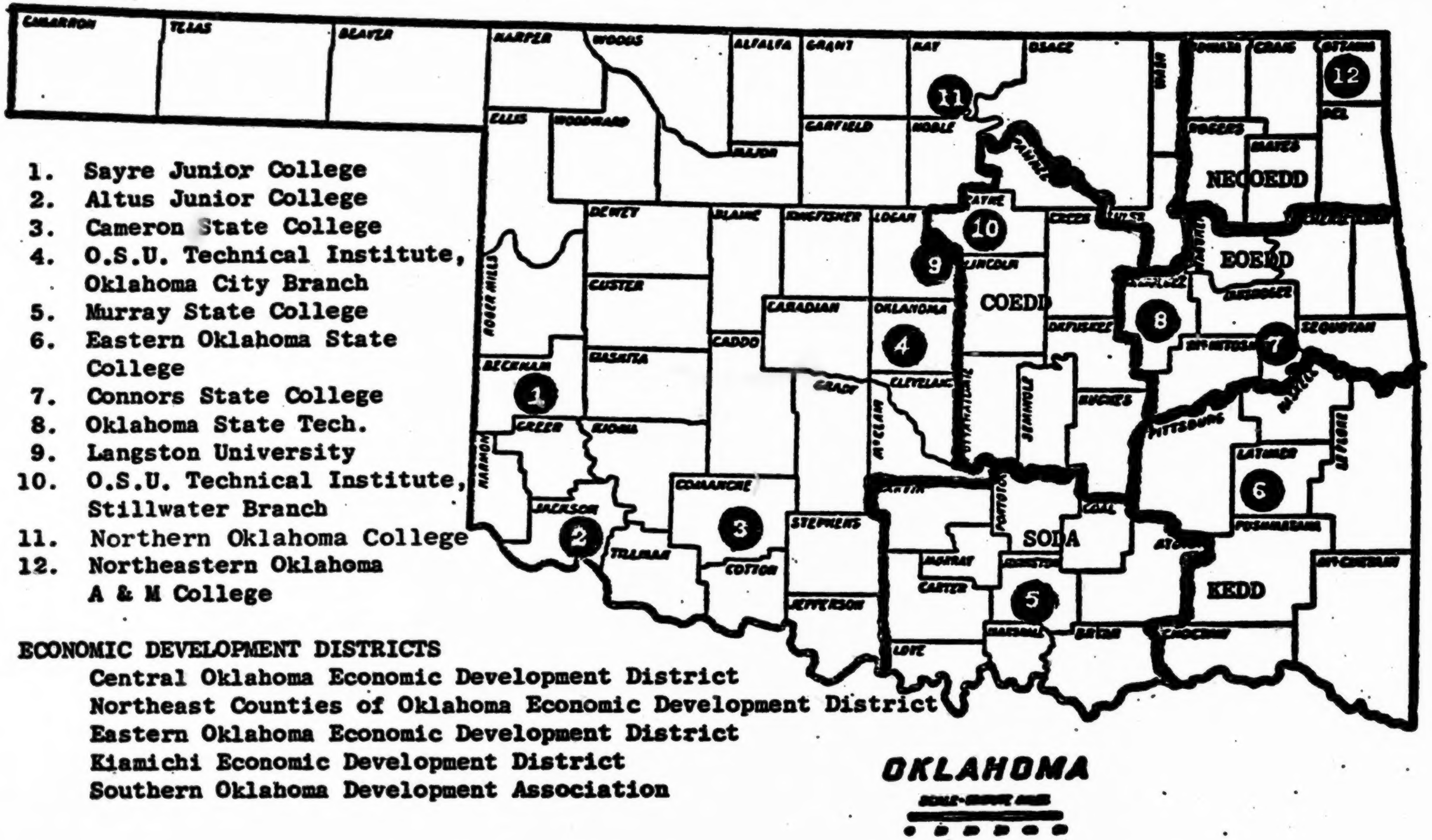
[24] The Strategy for Economic Development in Oklahoma, Oklahoma Industrial Development and Park Department, (Division of Research and Planning, Oklahoma City, 1967).


CIMARRON
TEXAS
BEAVER
HARPER
WOODS
ALFALFA
GRANT
KAY
OSAGE
NOWATA
CRAIG
OTTAWA
ELLIS
WOODWARD
MAJOR
GARFIELD
NOBLE
PAWNEE
ROGERS
MAYES
DELAWARE
DEWEY
BLAINE
KINGFISHER
LOGAN
PAYNE
CREEK
TULSA
ROGER MILLS
CUSTER
CANADIAN
OKLAHOMA
LINCOLN
OKFUSKEE
SEQUOYAH
WASHITA
CADDO
BECKHAM
GRADY
CLEVELAND
McCLAIN
POTTAWATOMIE
SEMINOLE
HUGHES
McINTOSH
PITTSBURG
LATIMER
LE FLORE
GREER
KIOWA
HARMON
JACKSON
TILLMAN
COMANCHE
COTTON
STEPHENS
JEFFERSON
GARVIN
MURRAY
JOHNSTON
CARTER
LOVE
MARSHALL
BRYAN
PONTOTOC
COAL
ATOKA
PUSHMATAHA
CHOCTAW
McCURTAIN
NECOEDD
EOEDD
COEDD
SODA
KEDD
1
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9
10
11
12
OKLAHOMA

1. Sayre Junior College
2. Altus Junior College
3. Cameron State College
4. O.S.U. Technical Institute, Oklahoma City Branch
5. Murray State College
6. Eastern Oklahoma State College
7. Connors State College
8. Oklahoma State Tech.
9. Langston University
10. O.S.U. Technical Institute, Stillwater Branch
11. Northern Oklahoma College
12. Northeastern Oklahoma A & M College

ECONOMIC DEVELOPMENT DISTRICTS

Central Oklahoma Economic Development District
Northeast Counties of Oklahoma Economic Development District
Eastern Oklahoma Economic Development District
Kiamichi Economic Development District
Southern Oklahoma Development Association

Figure 12 Post-High School Technical Programs and Economic Development Districts

clearly identified occupational objectives of less than baccalaureate level. For classification purposes, technical education was defined as two year full-time technology programs of the associate degree level.

The institutional mix providing technical programs fell into the following categories: Eight junior colleges; two technical institutes; Oklahoma State University School of Technical Training at Okmulgee; and Langston University. Of the 41 technical programs, the two Oklahoma State University Technical Institutes at Stillwater and Oklahoma State University School of Technical Training at Okmulgee accounted for 20, as did the combined eight junior colleges. Langston University had one program.

In terms of enrollments and graduates during the 1966-1967 school year, Oklahoma State University Technical Institutes at Stillwater and Oklahoma City and Oklahoma State University School of Technical Training at Okmulgee accounted for 68.8 per cent of the 1,908 full-time enrollments and 62.2 per cent of the 431 graduates. The junior colleges supplied 548 full-time enrollees, or 28.7 per cent, while Langston University supplied 47, or 2.5 per cent. The junior colleges supplied 159 graduates, or 36.9 per cent, while Langston University supplied 4, or 1 per cent of the total graduates.

The part-time portion of the total enrollment picture has steadily increased during the 1960's. This is in keeping with national trends. In the school year 1960-1961, part-time enrollments comprised only 9.5 per cent of the total, whereas in the 1966-1967 school it has increased to roughly one-third of the total. In addition, the area vocational-technical schools had 255 part-time adult enrollments.

Post-High School Business Education

Students who pursue post-high school business education programs normally do so in order to prepare for the world of work at the semi-professional and professional levels. The post-high school business programs in Oklahoma consist of training for students at the higher education level in public and private universities, colleges, and junior colleges. Many students concentrate their studies at proprietary business schools, while others are enrolled in adult courses offered by high schools and/or area vocational schools. Specific training in business skills is available at the Oklahoma State University School of Technical Training at Okmulgee. Also, federal financed programs (MDTA, ARA, and the Job Corps) offer some training or retraining in office skills.

There is a diversity of vocational business education programs. This diversity consists primarily of length of training, academic curricula (transfer or terminal), level of entry employment intended, qualifications of students, and cost. This diversity of educational experience appears to be consistent with the objectives of the various organizations involved in post-high school vocational business education.

A statewide study (1967) by the Research Coordinating Unit of Oklahoma State University examined plans of Oklahoma high school seniors.[25] The study determined that more than 40 per cent of the high school students completed more credits in business than any other vocational area. Business had more than twice the students of the second vocational field in which students completed credits. High school graduates who planned further education in business indicated the following plans: Almost 13 per cent planned to major in business administration areas, while an additional 5.4 per cent planned to major in secretarial science. In addition, almost 6 per cent planned to attend proprietary business schools. The preceding data indicates that a significant number of high school students plan training for semiprofessional entry positions in business. The additional manpower requirements for clerical occupations by 1970 and 1975 are shown in Table 10.[26]

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[25] Aspiration of Oklahoma High School Seniors, Preliminary Findings of the Research Coordinating Unit, (Oklahoma State University, Spring, 1967).

TABLE 10

ADDITIONAL CLERICAL MANPOWER REQUIREMENTS

Clerical Occupations	Employment Oct., 1966	Additional Requirements Oct., 1970	Additional Requirements Oct., 1975
Bookkeeper, Hand	9,020	2,080	4,080
Bookkeeper, Machine Operator	4,920	980	2,080
General Office Clerk	34,700	6,100	13,700
Key Punch Operator	2,020	380	1,005
Stenographer	9,410	2,240	4,740
Secretary	12,050	3,350	6,050
Tab Machine Operator	1,320	390	730
Other	46,500	10,800	23,800
TOTALS	119,940	26,320	56,185

Higher Education[27]

The 1966 data for lower division business enrollments in higher education in Oklahoma is presented in Table 11. The totals include all students who at the freshman or sophomore level indicated business or

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[26] Oklahoma Employment Security Commission, Manpower in Oklahoma (Oklahoma City, Oklahoma: December, 1964), and Ling-Temco-Vought, Inc., Vocational and Technical Skills and Literary Systems, (Dallas, Texas: August, 1967), p. 3-B-5.

[27] An Analysis of Post-High School Vocational Business Education Programs in Oklahoma, Preliminary findings of Harry E. Nowka, (Oklahoma State University, Summer, 1967).

TABLE 11

FALL, 1966 FRESHMEN AND SOPHOMORE BUSINESS ENROLLMENT IN OKLAHOMA INSTITUTIONS OF HIGHER EDUCATION

STATE INSTITUTIONS OF HIGHER LEARNING			
*1.	Central State College	Edmond	1,592
*2.	East Central State College	Ada	271
3.	Langston University	Langston	108
4.	Northeastern State College	Tahlequah	297
*5.	Northwestern State College	Alva	217
*6.	Oklahoma College of Liberal Arts	Chickasha	120
*7.	Oklahoma State University	Stillwater	1,424
*8.	Panhandle A & M College	Goodwell	118
9.	Southeastern State College	Durant	181
*10.	Southwestern State College	Weatherford	426
*11.	The University of Oklahoma	Norman	1,111
STATE JUNIOR COLLEGES			
*12.	Cameron State Agricultural College	Lawton	502
*13.	Connors State Agricultural College	Warner	72
*14.	Eastern Oklahoma A & M College	Wilburton	188
*15.	Murray State Agricultural College	Tishomingo	128
*16.	Northeastern Oklahoma A & M College	Miami	365
*17.	Northern Oklahoma College	Tonkawa	249
*18.	Oklahoma Military Academy	Claremore	67
INDEPENDENT SENIOR COLLEGES			
19.	Benedictine Heights College	Tulsa	None
*20.	Bethany Nazarene College	Bethany	155
*21.	Oklahoma Baptist University	Shawnee	91
22.	Oklahoma Christian College	Oklahoma City	92
*23.	Oklahoma City University	Oklahoma City	252
24.	Oral Roberts University	Tulsa	52
*25.	Phillips University	Enid	137
*26.	The University of Tulsa	Tulsa	944
INDEPENDENT AND MUNICIPAL JUNIOR COLLEGES			
27.	Bacone College	Muskogee	68
28.	Central Pilgrim College	Bartlesville	19
*29.	Saint Gregory's College	Shawnee	157
30.	Southwestern College	Oklahoma City	21
*31.	Altus Junior College	Altus	18
*32.	El Reno Junior College	El Reno	44
*33.	Poteau Community College	Poteau	27
*34.	Sayre Junior College	Sayre	13
*35.	Seminole Junior College	Seminole	NA
TECHNICAL INSTITUTES			
*36.	OSU School of Technical Training	Okmulgee	237

* Indicates that students could receive in 1966-1967 either a Certificate of Completion or an Associate Degree with a concentration in business.

Source: Oklahoma State Regents for Higher Education, State Capitol, Oklahoma City, Oklahoma.

business education as their area of emphasis. Many of the four year institutions have historically listed the business education students under the classification of education rather than business. In other colleges the business education students are not indicated. For these colleges there is no difference between the detailed listing of all business majors, including business education, and the summary total of business.

In 1966 only East Central State College listed separately the Vocational Business Short Course students in their report to the Oklahoma State Regents for Higher Education. Other institutions classified such students as Office Administration, Office Management, Secretarial Science, Secretarial Administration, Business Administration, General Business, Business, or Business Education students.

The enrollment data presented in Table 11 is based on a head count. Head-count data approximates the full-time equivalent students at most institutions. Most institutions enroll part-time and night students. The most frequently used method of classifying these students was to list all the part-time and night students as special students. Another method of classification was to combine the night enrollments with day enrollments. Under both methods students classified as either freshmen or sophomores who were pursuing certificates or associate degrees were included in the totals.

A few institutions have Manpower or other such programs that are engaged in business training or retraining. Most institutions have not included these students in their lower division enrollments.

Although many junior colleges have one year specialized business programs listed in their catalogs, only Northern Oklahoma College actually awards a one year Intensive Business Certificate. The Oklahoma State University School of Technical Training at Okmulgee also has one and two year business programs for which Certificates of Accomplishment are awarded. Many colleges have a 40 semester hour or two year business program for which an associate degree or certificate may be awarded. (See the asterisk that indicates such institutions in Table 11).

Most holders of associate degrees awarded by junior colleges have pursued an academic program leading to transfer to a four year college or university. Preliminary data indicates that business associate degree holders have increased significantly since 1960. While the orientation of the associate degree holders tends to be transfer in nature, many students terminate their higher education experience after receiving the certificate or associate degree.

Dr. Bill Gene Rainey in his doctoral dissertation entitled Articulation in Collegiate Education for Business,[28] indicates that 41.7 per cent of municipal and independent junior college students and 60.3 per cent of state junior college students who complete two years of junior college transfer, according to averages based on departmental chairman estimates.

Since 1960 several institutions have more than doubled their production of certificate holders. Preliminary data indicates that the state-supported institutions have produced more combined associate degree and certificate holders and also have had the greater increase in enrollment as shown by Table 12.

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[28] Bill Gene Rainey, Articulation in Collegiate Education for Business, unpublished doctoral dissertation, (University of Oklahoma, 1965), p. 36.

TABLE 12

FALL, 1959-1966 FRESHMEN AND SOPHOMORE BUSINESS ENROLLMENT IN OKLAHOMA INSTITUTES OF HIGHER EDUCATION

Fall Semester	Private and Municipal	State Supported Enrollments	Total Enrollments
1959-1960	1285	4199	5484
1960-1961	1391	4601	5992
1961-1962	1325	4847	6172
1962-1963	1321	5053	6374
1963-1964	1367	5275	6642
1964-1965	1569	6233	7802
1965-1966	2199	7659	9858
1966-1967	2090	7673	9763

Source: Oklahoma State Regents for Higher Education, State Capitol, Oklahoma City, Oklahoma.

As institutions change their functions, changes can be anticipated in the preceding programs. Examples of this are: Oklahoma College of Liberal Arts will delete the program while Panhandle State College has instituted the program. Cameron State College anticipates a one or two year certificate program when the college attains four year status.

Proprietary Business Schools

The proprietary business schools that are accredited by the Oklahoma State Accrediting Agency are concentrated in Oklahoma City and Tulsa. Less than 12 per cent of the students enrolled in proprietary business schools are outside the two metropolitan areas.

The schools involved teach a variety of skills and semiprofessional business subjects. Primarily the efforts tend to be concentrated in, first, the secretarial-stenographic skills; second, various levels of accounting; and third, automated machine operations.

Although the proprietary business schools are a major supplier of post-high school trained office employees, the total enrollment has not shown the rapid increase that is evident in lower division business enrollments in institutions of higher education in Oklahoma. Studies by the Oklahoma State Regents for Higher Education estimated that in 1963-1964 more than 5,000 individuals attended Oklahoma proprietary business schools and colleges each year.[29] The data for 1965 and 1966 seems to indicate almost the same number of individuals in attendence as in 1963-1964.

Table 13 shows the fall, 1966 proprietary business school enrollments. The enrollment data presented includes full-time, part-time and night students. At least one school offers correspondence training in business.

TABLE 13

FALL, 1966 PROPRIETARY BUSINESS SCHOOL ENROLLMENTS

1.	American Business College	Oklahoma City	27
2.	Bartlesville Business College	Bartlesville	63
3.	Blackwood Business College	Oklahoma City	99
4.	Dalton Business College	Lawton	41
5.	Draughon's School of Business	Oklahoma City	266
6.	Draughon's School of Business	Tulsa	296
7.	Enid Business College	Enid	169
8.	Hill's Business University, Inc.	Oklahoma City	231
9.	Oklahoma Institute of Technology	Oklahoma City	15
10.	Oklahoma School of Accountancy	Tulsa	637
11.	Oklahoma School of Banking	Oklahoma City	562
12.	Ponca City Business College	Ponca City	37
13.	Tulsa Business College	Tulsa	237
14.	Tulsa Technical College	Tulsa	79

Source: Oklahoma State Accrediting Agency, State Capitol, Oklahoma City, Oklahoma.

Students enrolled in correspondence courses were excluded from data presented in Tables 12 and 13. Table 14 shows the total enrollment of proprietary business schools from 1965 to 1967. Although data was available only for schools accredited by the Oklahoma State Accrediting Agency, it is estimated that more than 90 per cent of the students enrolled in proprietary business schools are included in the data.

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[29] Regents for Higher Education, Higher Education Opportunities and Needs in Oklahoma, (Oklahoma City, Oklahoma: September, 1965), p. 55.

TABLE 14

1965-1967 ENROLLMENTS OF PROPRIETARY BUSINESS SCHOOLS

Year	Enrollment
Spring, 1965	2031
Fall, 1965	2676
Spring, 1966	2427
Fall, 1966	2759
Spring, 1967	2422

Source: Oklahoma State Accrediting Agency, State Capitol, Oklahoma City, Oklahoma.

Adult Education

There are several types of adult post-high school business programs available. One example is the local effort of the Tulsa Public Schools in providing adult education. Table 15 shows that from 1960 to 1967 the offerings in adult business education expanded, while enrollments during this period of time increased almost 45 per cent. Many other high schools offer adult business programs; however, in recent years the emphasis has been placed on courses that can be supplemented by federal funds.

TABLE 15

ADULT BUSINESS CLASSES--TULSA PUBLIC SCHOOLS

Name of Class	E N R O L L	M E N T	B Y		Y E A R S			Total
	1960-61	1961-62	1962-63	1963-64	1964-65	1965-66	1966-67	
Business								
Bookkeeping I	70	66	61	75	108	90	98	568
Bookkeeping II	19	31	19	20	38	19	4	150
Business English	39	26	8	-	-	-	-	73
Business Machines	75	87	107	95	123	149	171	807
Shorthand IA	131	138	139	183	178	168	84	1,021
Shorthand IB	76	58	59	69	42	65	114	483
Shorthand Review	44	58	46	88	54	49	49	388
Dictation & Transcription	51	51	26	32	40	39	35	274
Typewriting I	183	154	143	93	101	-	-	674
Typewriting II	-	101	87	20	-	-	-	208
Typewriting I & II	-	16	8	206	292	355	420	1,297
Advanced Typewriting	33	33	53	55	37	91	67	369
Dictaphone Practice	9	18	17	27	14	19	13	117
Total	730	837	773	963	1,027	1,044	1,055	6,429

Source: Tulsa Public Schools, Tulsa, Oklahoma.

Federally Financed Programs

From 1961 to 1967 business courses have been offered through the MDTA and ARA as shown in Table 16. The locations have been concentrated in the eastern half of the state. Programs have varied in number of weeks of training, type of course, and location as shown for the 1967 fiscal year in Table 17.

TABLE 16

FEDERALLY FINANCED PROGRAMS

Years	MDTA Students	ARA Students	Total Students
1961-1962	0	297	297
1962-1963	120	0	120
1963-1964	80	30	110
1964-1965	526	0	526
1965-1966	130	35	165
1966-1967	75	0	75

Source: State Board for Vocational Education, Stillwater, Oklahoma.

TABLE 17

TYPE OF BUSINESS TRAINING AVAILABLE UNDER MDTA 1966-1967

Location	Course	Students	Weeks
NEO A & M, Miami	Stenographic Refresher	25	26
NEO A & M, Miami	Key Punch Operator	15	12
Poteau	Stenographic Refresher	20	26
Clinton	Clerk, General Office	15	20

Source: State Board for Vocational Education, Stillwater, Oklahoma.

Some programs are associated with junior colleges; however, most have been coordinated with local high schools. A few programs (Job Corps at Guthrie) have been developed independent of existing college or high school facilities. All of these programs fluctuate in location and offerings based on local labor market and socio-economic factors.

From 1965 to 1967 a limited amount of funds have been made available for approved adult enrollments in business and office education areas. Almost all of the reimbursed adult business and office courses have been offered either by local high schools or by area vocational schools as shown by Table 18.

TABLE 18

REIMBURSED PROGRAMS FOR ADULT BUSINESS-ENROLLMENTS

	Location	1965-1966	1966-1967	Area Schools Only 1966-1967
1.	Ardmore			149
2.	Clinton	41	43	
3.	Duncan	173		162
4.	Guthrie	71	92	
5.	Lawton		30	
6.	Oklahoma City	443	1,195	29
7.	Okmulgee	37		
8.	Sand Springs	10	30	
9.	Stillwater		40	
10.	Tulsa		24	12
11.	Woodward	54		
	TOTAL	829	1,454	352

Source: State Board for Vocational Education, Stillwater, Oklahoma.

More offerings are planned both by the area vocational schools and the high schools.

In conclusion: The primary effort in post-high school business training during recent years has been in institutions of higher education and the proprietary business schools as shown by Figure 13. Although several adult programs have been available, the total effort of such programs by the high schools and others has been limited. Federal monies expended have been aimed at local labor market needs and socio-economic problem areas. In the case of business and office education at the post-high school level, funds are made available only for those students who are receiving terminal adult vocational business instruction.

No funds have been available for planned curriculum of either terminal or transfer business programs for the higher education institutions or proprietary business schools. It should also be mentioned that distributive education programs at the post-high school level receive no federal support in Oklahoma and are practically nonexistent. This lack of emphasis on training for jobs in the service producing industries is notable since the service producing industries continued to provide the bulk of the job expansion as they had in previous years. The Vocational Act of 1963, which provides funds for business and office education, has had little impact on the total effort of vocational business education beyond the high school in Oklahoma.

Post-High School Health Occupational Programs

Post-high school training in health occupations has been concentrated in the licensed practical nurse and the nurse's aide programs. Both training programs have been designed to meet the needs of institutions in local areas. However, existing training programs do not appear to be producing enough employees in the health occupational areas. Data developed by the Oklahoma Employment Security Commission as shown in Table 19 indicates that many new employees will be needed by 1970.[30]

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[30] State Board for Vocational Education and Oklahoma Employment Security Commission, State Meeting on Vocational Education, May 19, 1967, Stillwater, Oklahoma.

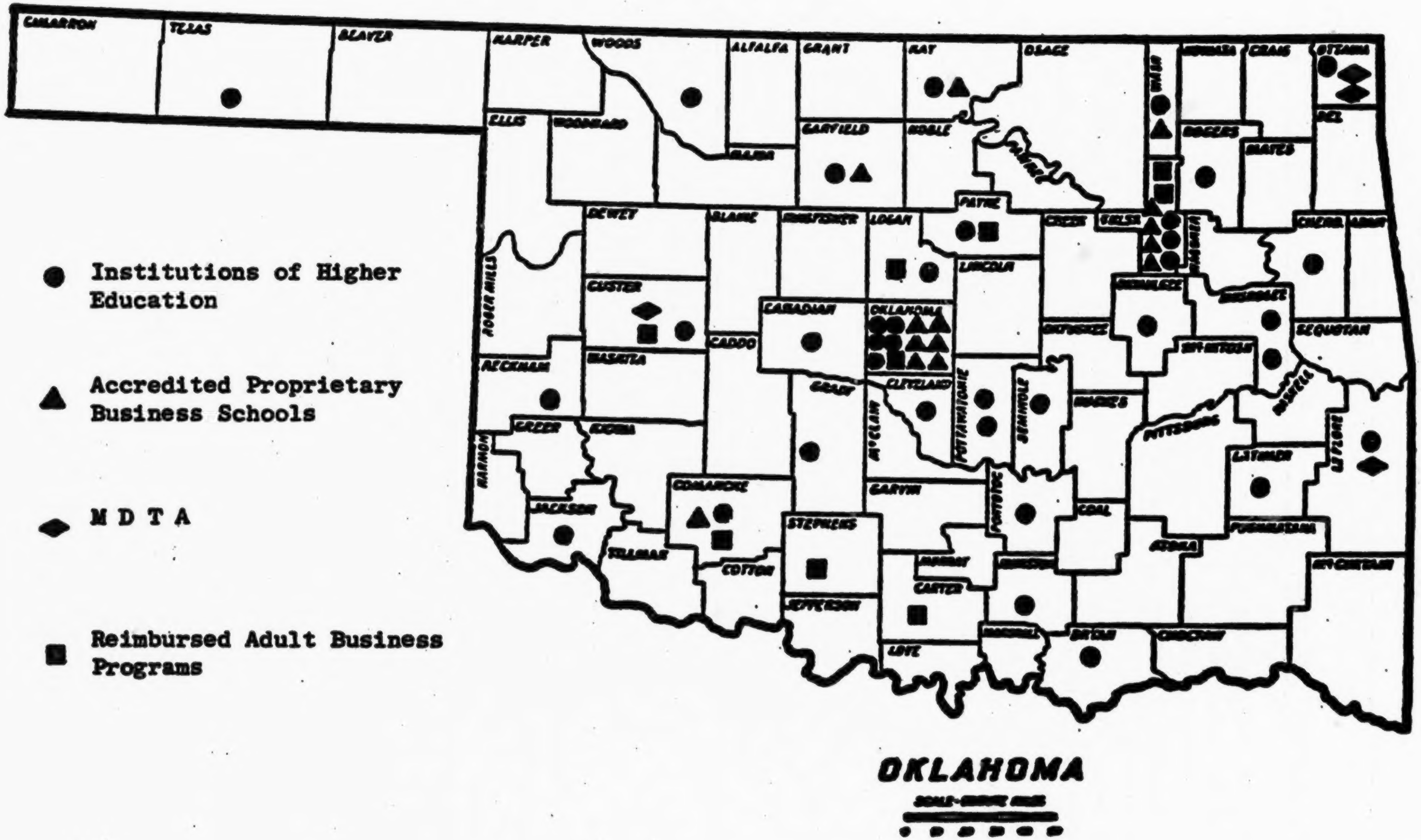
● Institutions of Higher Education
▲ Accredited Proprietary Business Schools
◆ M D T A
■ Reimbursed Adult Business Programs
CIMARRON
TEXAS
BEAVER
HARPER
WOODS
ALFALFA
GRANT
KAY
OSAGE
WASHINGTON
NOWATA
CRAIG
OTTAWA
ELLIS
WOODWARD
MAJOR
GARFIELD
NOBLE
PAWNEE
ROGERS
MAYES
DELAWARE
DEWEY
BLAINE
KINGFISHER
LOGAN
PAYNE
CREEK
TULSA
WAGONER
CHEROKEE
ADAIR
ROGER MILLS
CUSTER
CANADIAN
OKLAHOMA
LINCOLN
OKMULGEE
MUSKOGEE
SEQUOYAH
BECKHAM
WASHITA
CADDO
GRADY
CLEVELAND
McCLAIN
POTTAWATOMIE
SEMINOLE
HUGHES
McINTOSH
HASKELL
PITTSBURG
LATIMER
LE FLORE
HARMON
GREER
KIOWA
JACKSON
COMANCHE
TILLMAN
COTTON
STEPHENS
GARVIN
PONTOTOC
COAL
MURRAY
JOHNSTON
CARTER
JEFFERSON
LOVE
MARSHALL
BRYAN
ATOKA
PUSHMATAHA
CHOCTAW
McCURTAIN
OKLAHOMA

Figure 13 Locations of Post-High School Business and Office Education Programs--Fall, 1966.

TABLE 19

HEALTH OCCUPATIONS TRAINING

Occupational Category	Employment needs Fiscal 1967	Number Being Trained	Estimated No. of new employees needed by 1970
Registered Nurses	1,510		3,776
Refresher courses for unemployed RNs		17	
Associate Degree Nurses		*93	
Practical Nurses	4,000	**708	2,534
Nurse Aides	20,000	733	7,364
Medical Technician Assts.	Unspecified	0	100
Operating Room Technicians	760	24	330
Medical Records Technicians	400	0	234
Dental Office Assistants	Unspecified	19	Not determined
Medical Office Assistants	Unspecified	20	Not determined

* 28 from Cameron and 65 from Bacone
** 364 new enrollees in 1966-1967

Source: State Board for Vocational Education and Oklahoma Employment Security Commission, State Meeting on Vocational Education, May 19, 1967, Stillwater, Oklahoma.

It has been recommended to the employment service that a survey be made of the following health occupations to determine the need for training programs: Ward clerks, unit managers, certified medical laboratory assistants, radiologic technologists, inhalation therapists, orthopedic and prosthetic appliance constructors (Prosthetist and Orthotist), physical therapy assistants, environmental health aides, electrocardiographic technicians, electroencepholographic technicians, histologic technicians, and optical technicians. As was mentioned in the introduction to this chapter, the results from this survey are not completely available at this time. Even when the results are available from the Oklahoma Employment Security Commission, it may be desirable to seek additional information from employers of medical personnel in order to determine detailed educational requirements.

Formal training programs were offered by only two state-supported institutions of higher education in the fall of 1966. The University of Oklahoma Medical Center offers formal and informal programs for vocational and semiprofessional training in cytotechnology, dietetic internship, physical therapy, medical technology, social work, surgical tech aides, X-ray technology, and other medically related fields. Approximately 90 students were engaged in the various programs during the fall semester, 1966. Since 1963 the training program has been expanded to meet the needs of the Oklahoma Medical Center by increasing the paramedical training more than 40 per cent. The other program is a two year associate nursing degree program initiated in the fall of 1966 at Cameron State Agricultural College. The program had 28 enrollees in the first semester of operation.[31]

Bacone College, an independent junior college at Bacone, Oklahoma, also offers the associate degree in nursing. Table 20 shows the total new enrollees and graduates by semester since the program began in the summer of 1963. Five semesters are required for completion of the program.

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[31] Information furnished by Oklahoma State Regents for Higher Education, State Capitol, Oklahoma City, Oklahoma.

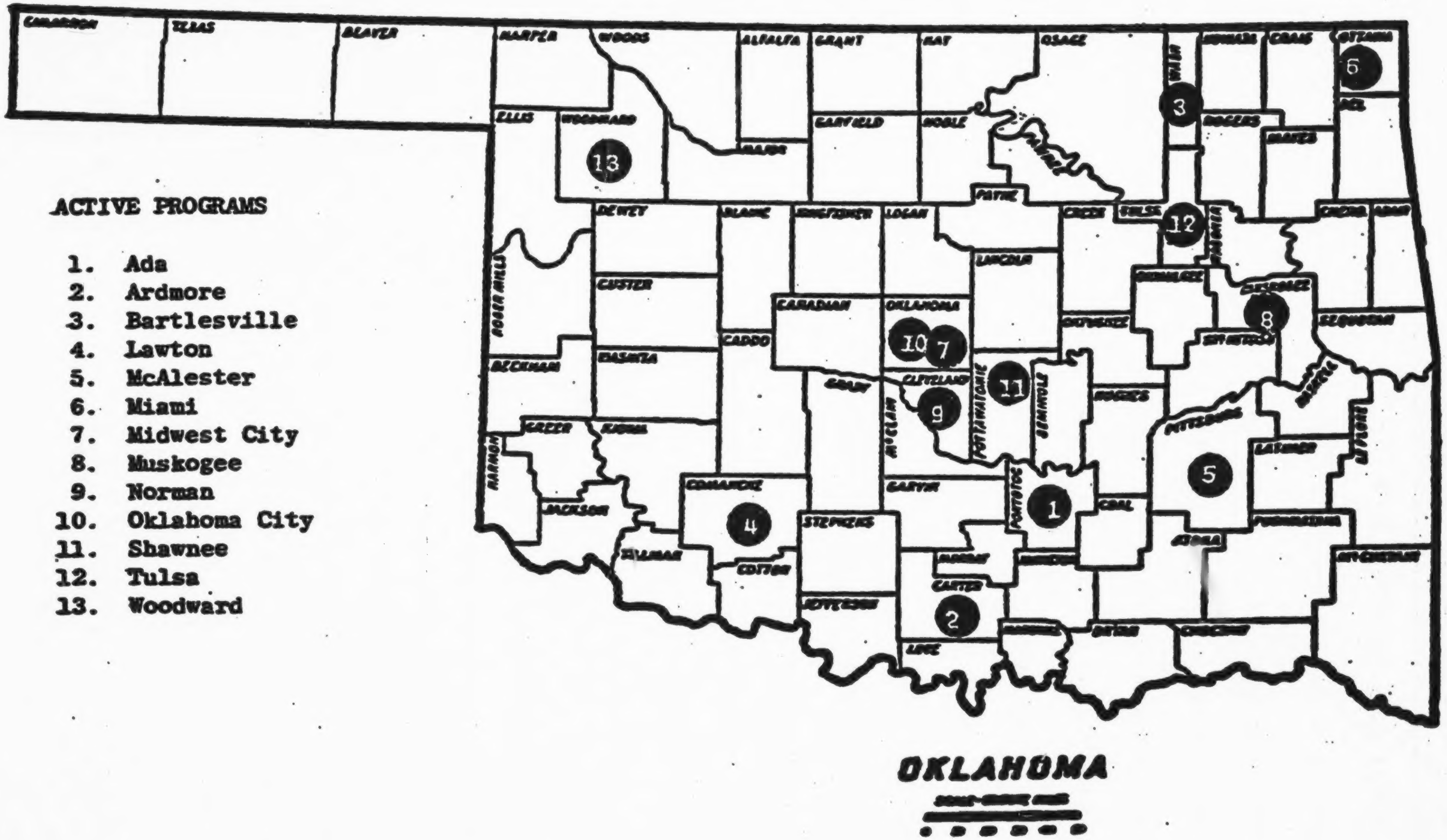
TABLE 20

BACONE COLLEGE--NEW ENROLLEES AND GRADUATES BY SEMESTER IN REGISTERED NURSING

Semester	New Enrollees	Graduates
Summer '63	30	0
Summer '64	29	0
Spring '65	0	14
Fall '65	38	0
Spring '66	0	15
Fall '66	27	0
Spring '67	0	25

Many licensed practical nurse training programs have centered their operation in medical facilities in the locations shown in Figure 14. The growth of these programs has not been adequate to meet the requirements for licensed practical nurses. The number of graduates as shown by Table 21 has increased slightly since 1960-1961.

The only area vocational-technical school that offered adult training programs for nurses' aides was the Ardmore Area Vocational-Technical School. The school had 15 students enrolled in the program in 1966-1967.


CIMARRON
TEXAS
BEAVER
HARPER
WOODS
ALFALFA
GRANT
KAY
OSAGE
WASHINGTON
CRAIG
OTTAWA
ELLIS
WOODWARD
MAJOR
GARFIELD
NOBLE
PAWNEE
ROGERS
ROGER MILLS
DEWEY
BLAINE
KINGFISHER
LOGAN
PAYNE
CREEK
TULSA
LINCOLN
CUSTER
CANADIAN
OKLAHOMA
OKMULGEE
MUSKOGEE
SEQUOYAH
BECKHAM
WASHITA
CADDO
CLEVELAND
POTTAWATOMIE
SEMINOLE
HUGHES
GRADY
McCLAIN
PITTSBURG
LATIMER
HARMON
GREER
KIOWA
JACKSON
COMANCHE
GARVIN
PONTOTOC
COAL
STEPHENS
CARTER
ATOKA
PUSHMATAHA
COTTON
JEFFERSON
LOVE
1
2
3
4
5
6
7
8
9
10
11
12
13
OKLAHOMA

ACTIVE PROGRAMS

1. Ada
2. Ardmore
3. Bartlesville
4. Lawton
5. McAlester
6. Miami
7. Midwest City
8. Muskogee
9. Norman
10. Oklahoma City
11. Shawnee
12. Tulsa
13. Woodward

Figure 14 Locations of Licensed Practical Nursing Programs in Oklahoma

TABLE 21

LICENSED PRACTICAL NURSES' PROGRAMS IN OKLAHOMA

Fiscal Year	Total Admitted*	Total Graduated*
7-1-55 to 6-30-56	41	---
7-1-56 to 6-30-57	44	26
7-1-57 to 6-30-58	116	36
7-1-58 to 6-30-59	244	90
7-1-59 to 6-30-60	303	183
7-1-60 to 6-30-61	288	234
7-1-61 to 6-30-62	266	211
7-1-62 to 6-30-63	278	202
7-1-63 to 6-30-64	248	216
7-1-64 to 6-30-65	261	206
7-1-65 to 6-30-66	365	212
7-1-66 to 6-23-67	353**	261
TOTAL	2,807	1,877

* Totals are for all Licensed Practical Nurse Programs for a period of one fiscal year.

** Total admissions during Fiscal 1967 were 364.

Source: State Board for Vocational Education, Stillwater, Oklahoma.

Enrollments in reimbursed adult education health occupation training programs were in excess of 600 during the school year 1966-1967 as shown by Table 22. All of these programs were nurse's aides or similar programs.

TABLE 22

ADULT HEALTH OCCUPATIONS ENROLLMENT BY LOCATION 1966-1967

Location	Total Enrollment	Location	Total Enrollment
Altus	60	Midwest City	29
Chickasha	16	Nowata	16
Claremore	16	Okemah	32
Cleveland	32	Oklahoma City	12
Clinton	16	Pawhuska	15
Cordell	15	Perry	14
Cushing	17	Pryor	31
Drumright	15	Purcell	16
El Reno	63	Seminole	13
Guthrie	57	Stigler	29
Konawa	16	Sulphur	15
Madill	15	Vinita	13
Miami	29	Watonga	12
TOTAL			614

Source: State Board for Vocational Education, Stillwater, Oklahoma.

In conclusion: The practical nursing programs as shown by Figure 14 and the nurses' aides programs as shown in Table 19 account for the major portion of post-high school paramedical education in Oklahoma. The data indicates that even though these and other health occupational training programs are available, the total enrollments and graduates are inadequate to meet the manpower needs of Oklahoma. The associate registered nursing program seems to be particularly in need of expansion. Other two year post-high school paramedical technical programs should be studied in the near future with an emphasis on employment practices, program

TABLE 23

LICENSED PRACTICAL NURSES' PROGRAMS IN OKLAHOMA

Program Designation	Total Admitted*	Total Graduated*
Ada	261	212
Ardmore	22	--
Baptist hospital (Stillwater and Miami)	28	26
Bartlesville	190	119
Clinton	31	27
Elk City	12	7
Lawton	275	195
McAlester	78	58
Miami	85	42
Midwest City	61	20
Muskogee	288	193
Norman	24	--
Oklahoma City	799	544
Shawnee	156	122
Tulsa	389	233
Woodward	108	79
TOTAL	2807	1877

* Totals are from time the program started at each location until June 23, 1967.

Source: State Board for Vocational Education, Stillwater, Oklahoma.

planning, and overall demand. Only one public supported program is in operation to date; yet, the medical and related occupational areas are expected to be one of the nation's largest employers in the early 1970's.

Other Public and Private Programs Which Contribute to the Overall Post-High School Vocational-Technical Training Picture in Oklahoma.

The preceding sections of this chapter dealt with enrollments and graduates in technical, business, and paramedical programs (primarily associate degree level) in public and private institutions. Some programs which do not fall into any of the above categories are offered by those same institutions and other institutions not previously mentioned. One training area of great importance is skill development, such as the skill training programs offered by Oklahoma State Tech at Okmulgee. The *Manpower in Oklahoma* report, published by the Oklahoma Employment Security Commission in December of 1964, indicated that 55,417 net additional workers in skilled areas alone would be needed by 1975.[32]

Programs at State-Supported Institutions

The state supported post-high school institution that offers the most extensive range of vocational training is the Oklahoma State University School of Technical Training at Okmulgee. Table 24 shows the various vocational courses offered there. The lengths of courses vary from one trimester (1/3 year) to six trimesters (2 years) and the courses normally involved a combination of classroom instruction and laboratory experiences.

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[32] Oklahoma Employment Security Commission, *Manpower in Oklahoma*, (Oklahoma City, Oklahoma: 1964), p. 80.

The Oklahoma Regents stated the following concerning Oklahoma State Tech:

> This institution was established in 1946 to provide skilled craftsmen and industrial technicians to serve 'that area of industry lying between the semiskilled and the engineering technicians.' Oklahoma State Tech, as the institution is now known, is a complex of 94 buildings containing 800,000 square feet of floor space devoted to training of young people in more than 30 occupational fields.[33]

TABLE 24

PROGRAMS OFFERED AT OKLAHOMA STATE UNIVERSITY SCHOOL OF TECHNICAL TRAINING AT OKMULGEE-- SCHOOL YEAR 1966-1967

Program	Years
Accounting	2
Appliance Repair	1-1/3
Auto Body	1-1/3
Paint Specialist	2/3
Metal Preparation	2/3
Body Customizing	1/3
Auto Body Shop Operation	1-2/3
Auto Mechanics	1-2/3
Tune-up Specialist	1
Automatic Transmissions	1
Brakes and Front Ends	1
Service Station Operation	1
Automotive Service Management	2
Auto Trim	1
Auto Glass	1/3
Auto Parts	1
Bakery	1-1/3
Cake and Pastry Production	1/3
Variety Breads and Rolls Production	1/3
Cake Decoration	1/3
Bookkeeping	1-1/3
Building Construction (Carpentry and Cabinet)	2
Clerk Typist	1
Commercial Art and Advertising	2
Culinary Arts	1-1/3
Baking	1/3
Fry Cook	1/3
Pantry and Salad	1/3
Dinner Cook	1/3

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[33] Oklahoma State Regents for Higher Education, Higher Education Opportunities and Needs in Oklahoma, Self-Study of Higher Education in Oklahoma, Report 7, (Oklahoma City, Oklahoma: September, 1965), p. 52.

TABLE 24 (Continued)

Program	Years
Diesel Fuel Injection	1
Diesel Mechanics	2
Drafting	2
Dry Cleaning	1-1/3
Wool Finishing	1/3
Silk Finishing	1/3
Dry Cleaning Procedures	1/3
Spotting and Wet Cleaning	1/3
Electrical Maintenance	1-2/3
Engineering Aide	2
Farm Machinery	2
Furniture Upholstery	1-1/3
General Business	2
Industrial Electrical Maintenance	2
Industrial Electronics	2
Key Punch Machine	1/3
Plumbing	1-2/3
Printing (Letterpress)	1-2/3
Machine Composition	1
Floor Work	1
Press Work	1-1/3
Printing (Lithography)	1-2/3
Refrigeration and Air Conditioning	2
Secretarial	1-1/3
Shoe, Boot and Saddle Repair	1-2/3
Shoe Repair	1
Bootmaking	2/3
Saddlemaking	2/3
Small Gasoline Engines	1
Stenographic	1
Teletypesetter Perforator	1/3
Television Electronics	2
Watchmaker and Micro-Instrumentation	2
Watchmaker	1-1/3
Micro-Instrumentation	2/3

Source: School Catalog from Oklahoma State Tech at Okmulgee.

Although several institutions of higher learning other than Oklahoma State Tech have terminal vocational programs available as shown by Table 25, a brief sample of preliminary findings on enrollments and graduates seems to indicate that several of the programs have small or nonexistent enrollments and graduates in recent years.

TABLE 25

TERMINAL PROGRAMS OF INSTRUCTION AVAILABLE AT OKLAHOMA DEGREE GRANTING COLLEGES ACADEMIC YEAR 1963-64

Curriculum	OU	OSU	OCLA	LU	CSC	ECSC	NWSC	SWSC	Cameron	Connors	Eastern	Murray	NEOAMC	NOC	Bethany	OBU	OCC	OCU	Tulsa	Phillips	Bacone	El Reno	Poteau	Sayre
Agriculture										X	X	X	X											
Art																					X			
Auto Mechanics									X		X							X					X	
Brick Masonry				X																				
Carpentry				X							X													X
Charter Life Underwriter																			X					
Charter Property & Casualty Underwriter																			X					
Communication Skills																								X
Electronics Technology																								
Environmental Control Technology									X				X					X						
Funeral Service Education*					X																			
Furniture Construction											X													
Home Economics										X		X									X			
Hospital Administration																X								
Industrial Arts, General													X								X			X
Linotype Operator														X										
Machinist													X											
Mechanical Technology											X													
Nursing													X								X			
Printing & Printing Composition														X										
Shoe Repair				X																				
Welding									X		X		X											
Woodworking				X									X										X	

* Three-year Program. All other programs listed are of one and two years duration.

Source: Oklahoma State Regents for Higher Education.

Note: Business, paramedical and technical programs are not shown above since they were treated earlier in this chapter.

Programs Other Than State-Supported

Apprenticeship Programs

The Bureau of Apprenticeship and Training of the U.S. Department of Labor was set up by the 75th Congress to act as a consultant between labor and the management of individual companies interested in setting up apprenticeship programs.

Apprenticeship concentrations vary between trades and locations according to the need for skilled workers. Most programs require two or more years of job training. According to Dorothy Singer at the Bureau in Oklahoma City, the greatest concentration of apprentices in Oklahoma is in the construction trades with the metal trades and other selected trades also having apprentices. New programs have opened up recently for orthopedic prosthetic technicians and optical technicians. At this time there are approximately 2,000 apprentices in these various categories throughout the state.

The FAA Academy

The training contribution of the Academy of the Federal Aviation Agency in Oklahoma City is unique among Oklahoma educational institutions in several respects. Its input is primarily persons already employed by the federal government. Its output, so to speak, is those same people returning to their jobs with enhanced skills. This facilitates the advancement of these persons, thus opening job positions for other persons with less training.

Four broad areas of course work are offered: Air traffic training, air navigation facilities training, flight standards training, and aircraft accident investigation training. Within each of these categories course work is narrow and intensive, designed with one particular job in mind. Lengths of training programs vary from the shortest, which requires only two days, to the longest, which requires 36 weeks in residence for completion. Due to the varying lengths of these programs, little can be done toward formulating meaningful comparisons of their enrollments with enrollments of programs operating on a semester basis. A typical resident enrollment for the entire Academy on a given day would be about 700 people, varying in the past between 400 and 1,000. To this is added an additional 9,000 students enrolled in correspondence or "directed" studies on a typical day. In the directed study program approximately 6,500 lessons per month are presently being processed. Enrollments in directed study have been steadily increasing for the last two years at the rate of about 90 persons per month enrolled on a given day. The number of students completing courses, both in resident and directed training, has been ranging between 520 and 1,200 and averaging about 725 per month.

Currently the FAA Academy is contracted to train technicians for the Tinker Air Force Base in a 35-week program. Persons entering this program need not have been on the job before the beginning of their training, being selected on the basis of standardized tests. Their training, like that of academy students in general, is narrow and intensive with the goal of training them to fill a particular job. Recently, there were approximately 120 students participating in the Tinker contract program.

Flight Schools

Various types of flight training are available from more than 20 schools in various parts of the state. The Federal Aviation Agency in Oklahoma City offers several training programs. Table 26 indicates the location and type of training available at selected flight schools.

Private, State-Accredited Vocational and Technical Programs

The Oklahoma State Board of Cosmetology accredited more than 50 privately-owned schools of cosmetology in 1964 as shown by Table 27. The schools provided a training program for the basic operator's course that required 1,000 hours for completion.

The barber schools are concentrated in Oklahoma City and Tulsa offering 1,200 hours of basic barber instruction and are accredited by the State Board of Barber Examiners. The seven schools included are: The Oklahoma Barber College, The Capitol Barber College, and the State Barber College--all of Oklahoma City; The International School of Barbering, the Oklahoma School of Barbering, and the Tulsa Barber College--all of Tulsa; and the Lawton Barber College at Lawton.

The barber and cosmetology programs in the state are almost 100 per cent in their support and control. The only state-supported barber or cosmetology curriculum in a post-secondary school or institution of higher learning is the cosmetology program at Langston Univeristy. Cosmetology is also offered at the Guthrie Job CorpsTraining Center.

Privately-supported schools have played only a minor role in the training of associate degree level technicians in Oklahoma. At this time, there is only one such program in Oklahoma that is accredited by the Oklahoma State Accrediting Agency. The Spartan School of Aeronautics offers this level of training along with other vocational training programs.

Other private schools accredited by the Oklahoma State Accrediting Agency for vocational training include: Draughon Technical Institute, Jubilee Meat School, Messer's School of Refrigeration, Oklahoma Farrier's College, Oklahoma Technical Institute, Southwest Automotive Schools,

TABLE 26

FLIGHT SCHOOLS OPERATING IN OKLAHOMA, 1964

School and Location	Basic Ground School	Advanced Ground School	Primary Flying School-Airplane	Primary Flying School-Glider	Primary Flying School-Helicopter	Instrument Flying School	Flight Instructor School	Commercial Flying School-Airplane	Commercial Flying School-Glider	Commercial Flying School-Helicopter
American Flyers, Inc., Ardmore	X	X	X			X	X	X		
B.J. Flying Service, Inc., Pryor	X		X							
Bell Flying Service, Inc., Enid			X							
Borchers Flying Service, Tahlequah	X	X	X							
Cameron State College, Lawton	X	X								
Cannon Aviation Co., Inc., Tulsa	X		X			X	X	X		
Catlin Aviation, Oklahoma City			X		X	X		X		
Downtown Airpark, Inc., Oklahoma City			X			X	X	X		
Executive Flight, Inc., Tulsa			X		X	X	X	X		
Monterosso Aviation, Tulsa	X		X			X	X	X		
O. K. Flying School, Okmulgee			X							
Oklahoma State University Flight School, Stillwater	X		X			X	X	X		
Sailplanes, Inc., Muskogee				X					X	
Sams Flying Service, Muskogee			X			X		X		
Southern Aviation, Lawton	X		X			X	X	X		
Spartan School of Aeronautics, Tulsa	X		X			X	X	X		
Strickland Aviation, Inc., Alva			X					X		
Traex Aviation Corporation, Bethany	X	X	X			X	X	X		
Tulakes Aviation, Inc., Bethany	X	X	X			X		X		
Tulsair School of Aviation, Tulsa	X	X	X			X	X	X		
Universal Aviation, Inc., Ponca City	X	X	X			X	X	X		
University of Oklahoma Flight School, Norman	X	X	X			X	X	X		
Van Zant Air Services, Inc., Norman			X							

Source: Federal Aviation Agency as shown in Higher Education Opportunities and Needs in Oklahoma -- Report 7, p. 57.

TABLE 27

PROPRIETARY SCHOOLS OF COSMETOLOGY OPERATING IN OKLAHOMA, 1964

School or College	Location	School or College	Location
Admiral Beauty School	Tulsa	Lela's Beauty College	Ada
Alin's Beauty College	Hollis	Louise's Beauty College	Norman
Altus Beauty College	Altus	Lucille's Beauty Academy	Collinsville
American Beauty College	Oklahoma City	Maurine's School of Beauty	Oklahoma City
Ardmore Beauty College	Ardmore	Miami Beauty College	Miami
Bartlesville Beauty College	Bartlesville	Midwest Beauty College	Midwest City
Beetch's Beauty Academy	Enid	Muskogee Beauty College	Muskogee
Brookside Beauty College	Tulsa	Nilar Jewel's Beauty College	Oklahoma City
Buddy's Modern Beauty College	Oklahoma City	Oklahoma Beauty College	Oklahoma City
Eve's College of Hairstyling	Lawton	Paul's Beauty College	Oklahoma City
Capitol Beauty College, Inc.	Oklahoma City	Peggy's Career Beauty	Oklahoma City
Central State Beauty College	Oklahoma City	Ponca School of Beauty Culture	Ponca City
Charles' School of Hair Design	Shawnee	Ray's School of Hair	Tulsa
Chickasha Beauty College	Chickasha	Richard's School of Hair Design	Oklahoma City
Clinton Beauty School	Clinton	Robert's Beauty Training Center	Tulsa
Don L. Beauty Academy	Hollis	Shawnee Beauty College	Shawnee
Enid Beauty College	Enid	Stephen's Beauty School	Lindsay
Henry's Beauty School	Chickasha	Sue Galloway's #1	Woodward
Hughes' Beauty Academy	Tulsa	Sue Galloway's #2	El Reno
Irene's Beauty Academy	Muskogee	Troupe's Beauty College	Tulsa
John Paul's Beauty College	Norman	Tulsa Academy of Basic & Advanced Hair	Tulsa
John Paul's Beauty College	Oklahoma City	Warr Acres Beauty College	Oklahoma City
John Paul's Beauty College	Stillwater	Weatherford Beauty College	Weatherford
Josie's Beauty College	Ponca City	Guymon Beauty College	Guymon
Lajean's Beauty School	Duncan	Mr. Darrell's Beauty College	Okmulgee
Lawton Beauty School	Lawton		

Source: Oklahoma State Regents for Higher Education.

Southwest Technical Institute, Southwestern College of Meat Cutters, Tulsa Technical College, and Tulsa Welding School. Several other non-accredited schools offer various levels of vocational training.

In conclusion: This chapter has given detailed attention to the post-high school technical, business, and paramedical programs, enrollments, and graduates. In addition, a section was devoted to other post-high school occupational programs which contribute to the overall vocational-technical picture in Oklahoma. It was noted in this section that although the percentage of growth projected for technical personnel is greater than the growth rate projected for skilled workers, the actual number of skilled workers needed exceeds that for technical workers. The rapid development of programs in service areas such as cosmetology were noted.

Technical programs constitute the largest sector of Oklahoma's public supported post-high school programs having clearly identified occupational objectives of less than baccalaureate level.

The business programs, and to some extent the paramedical programs, lack real committment to associate degree programming. The question should be asked: "Are those who do not complete the four year programs properly trained for semiprofessional jobs?" It might make more sense to key our training programs for full employability and to make provision for those who are capable and interested to transfer to a four year program with a minimum loss of credit. More detailed information on the employment practices of 2-year post-high school program graduates needs to be made available to manpower planners in Oklahoma.

CHAPTER V

ECONOMICS OF EDUCATION: COSTS AND RETURNS TO TECHNICAL EDUCATION

Projections of anticipated growth in major occupational groups indicate that of the most rapidly expanding will be the technical field. In Tulsa alone, a 37.2 per cent increase in demand for technicians is foreseen between 1965 and 1975.[34]

These anticipated needs, along with an integrated manpower policy toward matching these demands are certain to be an important force in Oklahoma's economic growth. Cost-benefit analysis is presented as a method toward which public policy makers may allocate scarce resources toward "optimizing" contributions to economic growth by institutions of higher education. A body of public policy makers has an array of educational program alternatives before them. One may invest his first dollar in the program which yields the highest return on that dollar. As more dollars are invested in a particular program, diminishing returns are realized to each successive dollar. A well-integrated public policy toward education sees all programs realizing similar rates of return in this method. Some abstraction is required in treating units of capital, etc., as homogeneous units, which they are not. In reality, lack of uniformity exists in these units of investment but the principle holds.

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[34] Manpower in Tulsa, Oklahoma State Employment Security Commission, (Oklahoma City, Oklahoma: May, 1965), p. 16.

To an individual considering education for himself, there comes the problem of determining whether educational expenditures are for "consumption" or for "investment." With technical education graduates it is assumed that most expenditures on the part of the individual are for investment purposes.

In the spring of 1967, Robert L. Dupree, a graduate student in economics at Oklahoma State University,[35] administered questionnaires to 1967 graduating technicians of Oklahoma technical institutes and junior colleges with sufficient graduates to determine expenditures by those students for books and materials and the number of semesters in attendance from which tuition and fees was estimated.[36] Costs which involved room and board, transportation, health and insurance, etc., were excluded as expenses of a similar nature would have been incurred had school been attended or not. Students also reported scholarships, summer and part-time income, and G.I. Bill benefits which offset the income which was foregone while attending school.

An estimate of earnings foregone due to attending school was obtained through 1960 census data for high school graduates. The median salary for males, ages 20 and 21 as reported by the Bureau of Census, is $1,969 per annum. This probably understates the higher interest, aptitude, and ability assumed to be characteristic of technical graduates and the median salary for males, ages 22 through 24, of $2,959[37] per annum or

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[35] Robert L. Dupree, "A Cost-Benefit Study of Post-High School Technical Education in Oklahoma," (Tentative Masters Thesis, Department of Economics, Oklahoma State University, Stillwater, Oklahoma, 1968).

[36] Maurice W. Roney and Paul V. Braden, Occupational Education Beyond the High School in Oklahoma, Preliminary Report, September 7, 1967, Oklahoma Economic Development Foundation, Norman, Oklahoma, pp. 50-69.

[37] U.S., Bureau of the Census, U.S. Census of the Population 1960, Subject Reports, Educational Attainment, U.S. Government Printing Office, Washington, D. C., 1963, p. 107.

$5,918 over a two year period, is probably more realistic. Table 28 is a summary of income foregone.

Average fees were calculated by weighing out-of-state student enrollment with total enrollment. The total cost to a 1967 graduate in technical education in Oklahoma is estimated to be $4,768. Table 29 shows the sources of this cost by institution.

TABLE 28

NET PER STUDENT INCOME FOREGONE WHILE ATTENDING TWO YEAR TECHNICAL PROGRAMS (In Dollars)

Institution*	G.I. Bill Benefits	Income Earned During Summer	Income Earned While Attending School	Scholarship, Fellowship, or Grant	Total Income	Income Foregone	Net Income Foregone
OSU	172	1,014	617	133	1,936	5,918	3,982
OST	272	281	534	541	1,627	5,918	4,290
OCT	108	1,066	1,762	77	3,012	5,918	2,906
Cameron	143	876	2,604	29	3,651	5,918	2,267
Eastern	000	727	707	319	1,753	5,918	4,164
NEO A & M	38	686	1,265	191	2,180	5,918	3,738
NOC	000	766	1,030	192	1,989	5,918	3,929
MSC	000	717	317	200	1,233	5,918	4,685
Average Weighted by Enrollment**	122	788	944	214	2,068	5,918	3,849

* See key on page 98.

** May not add exactly due to rounding.

TABLE 29

TOTAL COSTS OF EDUCATION TO EACH 1967 TECHNICAL SCHOOL GRADUATE BY SCHOOL (In Dollars)

School*	Books and Materials	Per Cent Non-Resident	Resident Per Student Fees[38]	Non-resident Per Student Fees[39]	Average Per Student Fees	Total Per Student Direct Costs	"Opportunity Costs"	Total Costs of Technical Education to Student
OSU	225	17.3	512	944	587	812	3,982	4,794
OST	31***	18.5	870****	1,470****	981	1,012	4,290	5,303
OCT	452	7.6	512	944	545	998	2,906	3,903
Cameron	111	0.0	288	720	288	399	2,267	2,667
Eastern	166	14.2	288	720	350	515	4,164	4,680
NEO A & M	190	13.7	288	720	347	537	3,738	4,275
NOC	220	0.0	288	720	288	508	3,929	4,437
MSC	115	0.0	288	720	288	403	4,687	5,088
Average Weighted by Enrollment**	196	13.7			722	919	3,849	4,768

* See key on page 98.

** Figures may not average due to rounding.

*** Costs apart from books and materials which are included in general fees.

**** Represents six quarters on trimester basis.

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[38] Oklahoma State Regents for Higher Education, Student Fees Authorized at Instutution in the Oklahoma State System of Higher Education, State Capitol, Oklahoma City, 1966.

[39] Ibid.

Costs of education to society come from two sources. The largest source is that productivity which is lost from the labor force while the student is attending school. This can be estimated as equal to the income the student foregoes offset by productive activity such as part-time or summer jobs which the student contributes while attending school. Table 30 is an analysis of productivity foregone by society while the student is in school. The mean productivity foregone is $4,186.

TABLE 30

STUDENT PRODUCTIVITY FOREGONE WHILE ENROLLED
IN TECHNICAL EDUCATION
(In Dollars)

School*	Unadjusted Productivity Foregone	Total Productive Activity While Enrolled	Net Productivity Foregone
OSU	5,918	1,631	4,287
OST	5,918	814	5,104
OCT	5,918	2,828	3,090
Cameron	5,918	3,479	2,439
Eastern	5,918	1,434	4,484
NEO A & M	5,918	1,951	3,967
NOC	5,918	1,796	4,121
MSC	5,918	1,033	4,885
Average Weighted by Enrollment**	5,918	1,732	4,186

* See key on page 98

** May not add exactly due to rounding

A second cost to society is the cost of operating educational institutions used by students. In comparing costs of operation on a per student basis, caution must be made in assuming exact intercomparison among the schools. Due to the high degree of diversification among these institutions, costs of operation will vary due to factors other than classroom activities. Oklahoma State University reflects a higher per student cost due to inclusion of graduate programs and large research and extension activities. Per student costs in the classroom also tend to vary inversely with the number of students enrolled in a course. Table 31 is a summary of total per-student costs for all students in academic years 1965-1966 and 1966-1967. The 1965-1966 figures are derived from current operating income and general expenditures for the various institutions as reflected in reports by Oklahoma State Regents for Higher Education.[40] The 1966-1967 figures are derived from budget

TABLE 31

TOTAL INSTITUTIONAL COSTS PER FULL-TIME EQUIVALENT STUDENT OVER A TWO YEAR PERIOD
(In Dollars)

School*	Amount Per FTE Student 1965-1966	Amount Per FTE Student 1966-1967	Total Per FTE Student
OSU	883	1,022	1,905
OST	760	910	1,670
OCT	444	406	851
Cameron	459	427	886
Eastern	559	562	1,121
NEO A & M	546	534	1,080
NOC	547	541	1,088
MSC	808	665	1,473
Average Weighted by Enrollment**			1,637

* See key on page 98.

** May not add exactly due to rounding.

Source: Oklahoma State Regents for Higher Education figures since actual expenditure figures are not yet available.[41] Table 32 combines Tables 30 and 31 to show total societal costs for a student enrolled in technical education in Oklahoma. Differences in productivity foregone might reflect wages and employment opportunities available to students at the various institutions. Schools located in or near large urban areas tend to reflect more earnings to offset productivity foregone. Society's cost for a two year technical student is estimated to be $5,823.

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[40] Oklahoma State Regents for Higher Education, Current Operating Income and Expenditures, Oklahoma State Colleges and Universities, Fiscal Year 1965-66, State Capitol, Oklahoma City, 1967, p. 6.

TABLE 32

TOTAL SOCIETAL COSTS PER STUDENT ENROLLED IN TWO YEAR TECHNICAL EDUCATION
(In Dollars)

School*	Total Productivity Foregone	Total Institutional Costs**	Total Societal Costs Per Student
OSU	4,287	1,905	6,192
OST	5,104	1,670	6,774
OCT	3,090	851	3,941
Cameron	2,439	886	3,325
Eastern	4,484	1,121	5,605
NEO A & M	3,967	1,080	5,047
NOC	4,121	1,088	5,209
MSC	4,885	1,473	6,358
Average Weighted by Enrollment	4,186	1,637	5,823

* See key on page 98.

** See Table 31.

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[41] Oklahoma State Regents for Higher Education, The Oklahoma State System of Higher Education, Education and General Budgets--Part I, Summarization and Analysis, Total Allocations to May 3, 1967, Oklahoma City, 1967.

Since costs of education of a technical student to society and to the student reflect a differential of $1,055, the returns to each will reflect different rates, somewhat to the benefit of the student.

In estimating the returns to technical education, life income projections are fast becoming irrelevant. The spector of retraining for and holding several different jobs over a lifetime may be a reality in a few decades.[42] The pay-back period method of calculating returns appears to be the most meaningful comparison of returns to education in this situation. Graduates who have achieved a higher level of education have also achieved a "hedging option" which makes them less vulnerable to technological change. Many may eventually move into management or receive further on-the-job training which makes lifetime income projections not solely attributable to educational attainment alone.

A second questionnaire was mailed by Dupree during the fall of 1967 to determine actual starting salaries of 1967 graduate technicians. Of the 220 graduates to whom questionnaires were mailed, 169, or 76.8 per cent, responded. Of this 169, 91, or 53.8 per cent, are employed; 60, or 35.5 per cent, are continuing their education; 16, or 9.5 per cent, are in the Armed Forces; and 3, or 1.8 per cent, are classified as "other." Perhaps one explanation for the large number of students continuing their education is the present military situation.

Table 33 shows starting salaries of 1967 Oklahoma graduate programs by school and by program. No respondent from Eastern Oklahoma A & M

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[42] Eli Ginzberb, The Development of Human Resources, (New York: McGraw-Hill Book Co., 1966), pp. 232-233.

College or from Murray State Agricultural College could be classified as employed from the response. Hence, no measure of salary is available from either of those schools. Where a small number of respondents represents the salary for a particular school or program, the estimate can be said to represent that school or program with less validity. A portion of the high starting salaries for graduates of the Oklahoma State University Technical Institute, Oklahoma City Branch, may be attributable to factors other than education. Since that institution operates during the evening, some of the high starting salaries may be explained by experience and on-the-job training. Due to the questionnaire method of obtaining information about salaries, the possibility exists that some bias exists concerning non-response. This bias, whatever its direction, is not assumed to be large since almost 77 per cent of the 1967 graduate technicians responded.

TABLE 33

AVERAGE YEARLY STARTING SALARIES OF 1967 OKLAHOMA GRADUATE TECHNICIANS BY SCHOOL AND PROGRAM

	SCHOOL						Average by Program
Program	OSU	OST	OCT	Cameron	NEOAMC	NOC	
Electronics	$6,847 N=14	$5,861 N=10	$6,560 N=11	$6,252 N=1	$4,656 N=4	$5,730 N=2	$6,261 N=42
Drafting & Design	5,910 N=3	6,097 N=11	6,773 N=1	6,213 N=2	5,250 N=2		6,026 N=19
Data Processing	6,247 N=2		7,200 N=3		5,042 N=9	4,440 N=1	5,594 N=15
Nuclear & Radiation	5,872 N=6						5,872 N=6
Fire Protection	7,812 N=1						7,812 N=1
Aeronautical	6,618 N=2						6,618 N=2
Metal	6,247 N=2						6,247 N=2
Environmental			8,528 N=1				8,528 N=1
Instrumentation			6,528 N=1				6,528 N=1
Chemical					6,360 N=2		6,360 N=2
Average by School	6,495 N=30	5,987 N=21	6,799 N=17	6,226 N=3	5,131 N=17	5,300 N=3	6,131 N=91

The starting salary of $6,131 closely approximates tentative findings in the first report of $6,132.[43] Starting salaries for technicians appear to be higher than those of many baccalaureate programs in spite of less investment in time and capital. The earlier rate-of-return estimate of 34.7 per cent and 24.9 per cent to society has not changed. Costs of education to the student are equalled with net earnings in three and one-fourth years and the costs of education to society are met in four years exactly.

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[43] Ibid, p. 67.

A few additional remarks will be made at this point relating to institutional costs at Oklahoma State Tech at Okmulgee. A detailed analysis of institutional income and expenditures was made by Gordon E. Von Stroh in his doctoral dissertation entitled, "A Socio-Economic Study of Vocational-Technical Education Students:"

> The two principal sources of income for Oklahoma State Tech during the fiscal year, 1965-1966 were student fees and state appropriations. Student fees made up 35.9 per cent of the total income of Oklahoma State Tech. For all institutions in the state system of higher education, student fees averaged 23.5 per cent of total income. No other institution received a higher percentage of its income from student fees than Oklahoma State Tech. The student at Oklahoma State Tech is paying a much higher per cent of the total costs of his education than are his counterparts at other Oklahoma state institutions of higher education. State appropriations provided 51.3 per cent of Oklahoma State Tech's income. For all state institutions, state appropriations accounted for 61.1 per cent of the total income. Comparing the two year colleges with Oklahoma State Tech, there is an even greater difference in the source of funds on a percentage basis. Student fees at the two year colleges averaged about one-half the per cent of Oklahoma State Tech's student fees as a part of total income. To offset this smaller per cent, state appropriations to the two year colleges averaged about 20 per cent higher than Oklahoma State Tech's state appropriations.
>
> On a per-full-time equivalent basis, about the same amount, $799.00, was received on each Oklahoma State Tech student versus the average amount, $807.00, received on students in all institutions in the state system of higher education. Oklahoma State Tech students paid an average of $287.00 in fees. This was about $100.00 more than the all-institution average for student fees. The average state appropriation per full-time-equivalent student was $493.00 for all institutions. Oklahoma State Tech received only $410.00 per full-time-equivalent student from state appropriations. It is apparent that in comparison to other Oklahoma state institutions, the students at Oklahoma State Tech are paying a greater share of their education.[44]

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[44] Gordon E. Von Stroh, "A Socio-Economic Study of Vocational-Technical Education Students," (unpublished Ph.D. dissertation, Department of Economics, University of Oklahoma, Norman, Oklahoma, 1968), pp. 256-257.

To further accentuate the financial burden on the students at Oklahoma State Tech at Okmulgee, Von Stroh found that:

> ....the parental income of Oklahoma State Tech students was considerably lower than the parental income of students from the other state institutions of higher education. About 60 per cent of the graduates' parents had below $5,000 in income, 26 per cent had between $5,000 and $9,999 in income, and 14 per cent had over $10,000 in income. For the parents of the 1962 first-time freshmen in the Oklahoma state system of higher education, 31 per cent of the families had below $5,000 in income, 51 per cent were in the $5,000 to $9,999 category, and 18 per cent had more than $10,000 in income. In 1960, 54 per cent of Oklahoma families had less than $5,000 in income, 36 per cent had between $5,000 and $9,999, and 10 per cent had income above $10,000. If income bore no relationship to education, slightly more than one-half of the students in Oklahoma state higher education institutions should have come from families earning less than $5,000. However, about 30 per cent of the first-time freshmen in all Oklahoma state colleges and universities came from that group and about 60 per cent of the Oklahoma State Tech graduates came from that group.[45]

The findings are intended to establish the rate-of-return to technical education in Oklahoma and not as a comparison of economic effectiveness of the schools involved. There seem to be indications of underinvestment in technical education as compared with higher education in general. The rate-of-return to higher education has been established at about nine per cent.[46] But technical education seems to be underinvested by comparison throughout the United States. A study in North Carolina demonstrated that underinvestment in technical education is not unique to Oklahoma.[47]

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[45] Ibid, pp. 262-263.

[46] G. S. Becker, "Under-investment in Education?" American Economic Review, L (May, 1960), p. 347.

[47] Adger B. Carroll and Loren A. Ihnen, Costs and Returns of Technical Education: A Pilot Study, Office of Manpower Policy, Evaluation and Research, U.S. Department of Labor, (Washington: U.S. Government Printing Office, 1966), p. 2.

The rate-of-return estimate of 34.7 per cent to the individual and 24.9 per cent to society was established on the basis of 41.6 years of productive activity. Costs of technical education to the student are equalled with net earnings in three and one-fourth years and the costs of a technical education to society are met in four years.

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* Key for Institutions or Schools on Tables

OSU - (Oklahoma State University Technical Institute, Stillwater).

OST - (Oklahoma State Tech, Okmulgee).

OCT - (OSU Oklahoma City Technical Institute, Oklahoma City).

Cameron - (Cameron State Agricultural College, Lawton).

Eastern - (Eastern Oklahoma State College, Wilburton).

NEO A & M - (Northeastern Oklahoma A & M College, Miami).

NOC - (Northern Oklahoma College, Tonkawa).

MSC - (Murray State Agricultural College, Tishomingo).

CHAPTER VI

THE MOBILITY OF TECHNICIAN PROGRAM GRADUATES

In order to determine any benefits which a particular state might derive from technician education at the two year post-high school level, it is necessary to do a follow-up study on placement of recent graduates. A review of the literature on the relationship of manpower utilization to mobility revealed the following relevant points. The President's Committee on Manpower in the 1965 Manpower Report to the President stated:

> Matching workers and jobs is one of the chief goals of an active manpower policy. The progress we make toward this objective depends, in part, on achievements in the two other major areas of manpower policy--the creation of jobs and the development of workers' abilities. But the degree of worker mobility--between employers, industries, occupations, and geographic areas--is another determining factor.[48]

Likert and Seashore state:

> The problems of manpower are essentially of three kinds: (1) those concerned with the composition of the labor force as to sex, age, skills, and other critical characteristics, (2) those concerned with the availability of manpower in terms of numbers, geographic location, and mobility, and (3) those concerned with the effective utilization of manpower in the jobs to be done.[49]

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[48] U.S., Department of Labor, Manpower Report of the President and a Report on Manpower Requirements, Resources, Utilization, and Training, (Washington: U.S. Printing Office, March, 1965), p. 143.

[49] Rensis Likert and Stanley E. Seashore, "Increasing Utilization Through Better Management of Human Resources," Manpower in the United States: Problems and Policies, Harper & Brothers, New York, 1954, p. 23.

Dale Yoder readily points out:

> ....mobility is a quality of manpower that is of special significance in modern economies. The degree of such mobility is directly influencial in its effects on the efficient use of manpower resources.... Since human resources are scarce and valued above all others, their mobility thus becomes a matter of primary concern to all modern societies.[50]

The President's Committee on Manpower reported in the 1965 Manpower Report to the President that:

> About 1 out of 15 persons migrate each year--that is, moves from one county to another. About half of them move to another state. Many of the migrates are young people whose mobility is associated with an attempt to find a job, a discharge from military service, completion of education, and personal considerations such as marriage.[51]

There have been many studies dealing with geographic mobility. The U.S. Department of Labor, Office of Manpower, Automation, and Training list many of the factors which impede or facilitate mobility in the following statement:

> The willingness and ability to move are affected by such personal characteristics as age, sex, race; by social factors such as level of education, marital status, or income level; by institutional and environmental factors such as employment practices and home ownership; and individual needs such as the desire for security and for advancement opportunities.[52]

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[50] Dale Yoder, "Manpower Mobility: Two Studies," Labor Mobility and Economic Opportunity, (New York: The Technology Press of Massachusetts Institute of Technology and John Wiley & Sons, Inc., 1954), p. 80.

[51] U.S., Department of Labor, Manpower Report of the President and a Report on Manpower Requirements, Resources, Utilization, and Training, (Washington: U.S. Printing Office, March, 1965), p. 147.

[52] U.S., Department of Labor, Office of Manpower, Automation, and Training, "Mobility and Worker Adaption to Economic Change in the United States," Manpower Research, Bulletin No. 1, Washington, D.C., July, 1963, p. 23.

The variable which employers in Oklahoma have an opportunity to control is their own employment practices. Wilfred Bates, in the preliminary findings from his doctoral dissertation entitled "An Examination of the Relationship of Selected Variables to Geographic Mobility of Technician Graduates of the Associate Degree Programs in Oklahoma," surveyed the Spring, 1967 graduates of post-high school technician programs in Oklahoma to determine how present employment practices affect mobility of the recent technician graduate. Bates utilized a population of 79 junior college technician graduates and 96 technical institute graduates in the Spring, 1967 graduating class.

Bates made every effort to limit his population to Spring, 1967 graduates since employment conditions would be the same for all graduates. The graduates of the Oklahoma State University School of Technical Training at Okmulgee were not included since the school is on a trimester system and graduation falls at different dates than the graduates from other institutions. In addition, graduates of technical programs completing their work in January were omitted from the population for the same reason. The following represents an analysis of his preliminary findings.

An Analysis of Graduate Technician Mobility

Because both junior college and technical institute graduates were surveyed during their job hunting period, an excellent opportunity was presented to analyze their views concerning Oklahoma with respect to employment (See Table 34). Of the 79 junior college graduates in the study, 74 answered the question, "How would you view your future in Oklahoma as compared to your future in another state?" Of the 74 who answered, 30, or 40.5 per cent, viewed their future as being better in another state. Of the 96 technical institute graduates, 92 answered this question. Of the 92 who answered, 63, or 68.5 per cent, viewed their future as better in another state. Over half of the combined group, or 56.0 per cent, viewed their future as better outside of Oklahoma.

TABLE 34

HOW TECHNICIAN GRADUATES VIEW THEIR FUTURE IN OKLAHOMA

	Type of Institution					
	Junior College		Tech Institute		Total	
Response:	No.	Pct.	No.	Pct.	No.	Pct.
Better in Oklahoma	12	16.2	6	6.5	18	10.8
About the same	32	43.2	23	25.0	55	33.1
Better in another state	30	40.5	63	68.5	93	56.0
TOTAL	74	99.9	92	100.0	166	99.9

A comparison of junior college and technical institute Spring, 1967 graduates who actually accepted employment in Oklahoma as opposed to those who accepted employment out of state is presented in Table 35. Only 24 of the junior college and 64 of the technical institute graduates accepted employment of which over half, or 56.8 per cent, had accepted employment out of state.

TABLE 35

GEOGRAPHIC LOCATION OF TECHNICIAN GRADUATES WHO ACCEPTED EMPLOYMENT

	Type of Institution					
	Junior Colleges		Tech Institute		Total	
Located:	No.	Pct.	No.	Pct.	No.	Pct.
In Oklahoma	18	75.0	20	31.2	38	43.1
Out-of-state	6	25.0	44	68.8	50	56.8
TOTAL	24	100.0	64	100.0	88	100.0

Figure 15 shows the total mobility of Spring, 1967 technical program graduates. When all 166 respondents of the population of 175 are considered, 30.1 per cent of the graduates have taken employment out-of-state. Of the graduates who did not go outside Oklahoma, 22.9 per cent took employment in the state, 37.3 per cent planned to reenter college, 6.6 per cent went to the military, and 3.0 per cent have not taken employment. On the crucial point of out migration, 47.8 per cent of the technical institute graduates and 8.1 per cent of the junior college graduates accepted employment outside Oklahoma.

Gordon Von Stroh conducted a follow-up study of graduates from Oklahoma State University School of Technical Training at Okmulgee.[53] He reported that at graduation time, 42.2 per cent of them indicated they would seek work outside Oklahoma, giving "better job opportunities" as their dominant reason. Of those 210 graduates, 153 had answered his questionnaire six months later. Forty-two of the 113 who took employment, or 37.2 per cent of them, indicated they actually had accepted employment out-of-state. Seventy-one, or 62.8 per cent, of them had accepted employment in state.

The key issue in technician manpower out migration does not seem to be due to a poor attitude toward Oklahoma. Table 36 shows the response of the 6 junior college and 43 technical institute graduates from the above who accepted employment out-of-state to the question "If you had an opportunity to obtain a better job, would you remain in Oklahoma?" The combined responses of junior college and technical institute graduates show that 81.6 per cent would remain in Oklahoma.

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[53] Gordon E. Von Stroh, "A Socio-Economic Study of Vocational-Technical Education Students," (unpublished Ph.D. dissertation, University of Oklahoma, Department of Economics, 1968), p. 174.

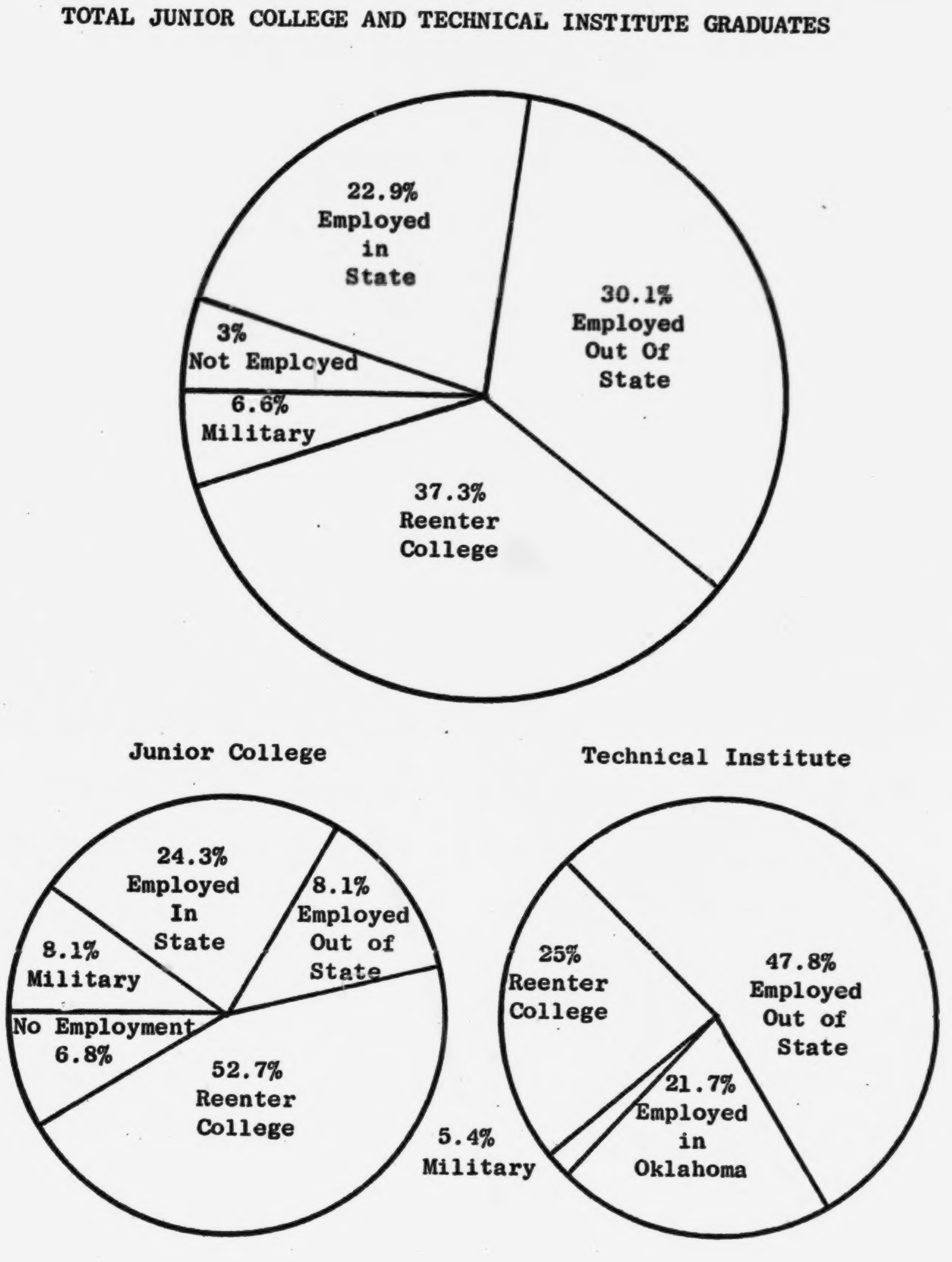

Figure 15. The Mobility of 166 Technician Program Graduates in Spring, 1967, Associate Degree Level--92 Technical Institute Graduates and 74 Junior College Graduates.

TABLE 36

EXPRESSED DESIRE TO REMAIN IN OKLAHOMA OF TECHNICIAN GRADUATES WHO ACCEPTED EMPLOYMENT OUT-OF-STATE

	Type of Institution					
	Junior College		Tech Institute		Total	
Response:	No.	Pct.	No.	Pct.	No.	Pct.
Yes	4	66.7	36	83.7	40	81.6
No	2	33.3	7	16.3	9	18.4
TOTAL	6	100.0	43	100.0	49	100.0

Technical program graduates who left the state for employment were asked about their thoughts concerning someday returning to Oklahoma. Table 37 shows that 59.2 per cent would not mind returning to Oklahoma to live. In fact, 83.7 per cent of those who left Oklahoma for employment show a strong association with the state.

What was the recruitment effort of Oklahoma firms as opposed to those from out-of-state?

A series of questions related to recruitment efforts of Oklahoma and out-of-state firms was responded to by 74 junior college and 91 technical institute graduates. Table 38 shows how many graduates received recruitment literature from Oklahoma and out-of-state firms. Out of a total of 722 pieces of literature, 483, or 66.9 per cent, were received from out-of-state firms.

TABLE 37

EXPRESSED DESIRE OF TECHNICIAN GRADUATES WHO ACCEPTED EMPLOYMENT OUT-OF-STATE TO AGAIN LIVE IN OKLAHOMA

	Type of Institution					
	Junior College		Tech Institute		Total	
Response:	No.	Pct.	No.	Pct.	No.	Pct.
The thought never seriously entered my mind	2	33.3	3	7.0	5	10.2
Under no circumstances would I again live in Oklahoma	0	0.0	3	7.0	3	6.1
I wouldn't mind returning to Oklahoma to live	1	16.7	28	65.1	29	59.2
I definitely intend to return to Oklahoma to live sometime	3	50.0	9	20.9	12	24.5
TOTAL	6	100.0	43	100.0	49	100.0

TABLE 38

RECRUITMENT LITERATURE ACTUALLY RECEIVED BY TECHNICIAN GRADUATES

	Type of Institution					
	Junior College		Tech Institute		Total	
Received from:	No.	Pct.	No.	Pct.	No.	Pct.
Oklahoma Employers	116	64.1	123	22.7	239	33.1
Out-of-state Employers	65	35.9	418	77.3	483	66.9
TOTAL	181	100.0	541	100.0	722	100.0

The number of representatives who actually made personal appearances from Oklahoma firms as opposed to out-of-state firms is presented in Table 39. Out of 164 representatives, the junior college graduates reported that 132, or 80.5 per cent, were from Oklahoma. The technical institute graduates reported only 119 of 469, or 25.4 per cent, from Oklahoma. The combined group reported that 251 representatives of 633, or 39.7 per cent, were from Oklahoma. It appears clear that Oklahoma firms should reexamine their school visitation policy, particularly in terms of the technical institutes.

TABLE 39

NUMBER OF PERSONAL APPEARANCES BY EMPLOYER REPRESENTATIVES OTHER THAN RECRUITERS

	Type of Institution					
	Junior College		Tech Institute		Total	
Representatives from:	No.	Pct.	No.	Pct.	No.	Pct.
Oklahoma Employers	132	80.5	119	25.4	251	39.7
Out-of-state Employers	32	19.5	350	74.6	382	60.3
TOTAL	164	100.0	469	100.0	633	100.0

The number of opportunities for visitations to Oklahoma industries opposed to out-of-state industries is presented in Table 40. The junior college graduates reported that of 136 opportunities for visitations to industry, 101, or 74.3 per cent, were with Oklahoma industry. The technical institute graduates reported that of 304 opportunities for visitations, 230, or 75.7 per cent, were with Oklahoma firms. The combined group of graduates reported that of 440 opportunities for visitations, 331, or 75.2 per cent, were with Oklahoma firms. This high percentage is expected since geographic distance is a factor in the cost of such efforts.

TABLE 40

SCHOOL-SPONSORED VISITS TO INDUSTRY

	Type of Institution					
	Junior College		Tech Institute		Total	
Opportunity to Visit:	No.	Pct.	No.	Pct.	No.	Pct.
Oklahoma Industry	101	74.3	230	75.7	331	75.2
Out-of-state Industry	35	25.7	74	24.3	109	24.8
TOTAL	136	100.0	304	100.0	440	100.0

How many graduates received actual job offers or participated in interviews?

The following analysis is concerned with the responses of all 24 junior college and 42 of 43 technical institute graduates who accepted employment. Table 41 shows that of 92 interviews, junior college graduates reported that 54, or 58.7 per cent, were with Oklahoma firms. Technical institute graduates reported that of 497 interviews, 152, or 30.6 per cent, were with Oklahoma firms. The combined group of graduates reported that of 589 interviews, 206, or 35.0 per cent, were with Oklahoma firms. The percentage of interviews conducted by Oklahoma firms seems very low, especially in the case of technical institutes.

TABLE 41

NUMBER OF INTERVIEWS HAD BY TECHNICIAN GRADUATES WHO ACCEPTED EMPLOYMENT

	Type of Institution					
	Junior College		Tech Institute		Total	
Interviewed by:	No.	Pct.	No.	Pct.	No.	Pct.
Oklahoma Employers	54	58.7	152	30.6	206	35.0
Out-of-state Employers	38	41.3	345	69.4	383	65.0
TOTAL	92	100.0	497	100.0	589	100.0

Table 42 shows the number of interviews actually held at junior colleges and technical institutes. The junior college graduates reported that of 26 interviews, 19, or 73.1 per cent, were held on campus with Oklahoma employers, whereas the technical institute graduates reported that of 392 interviews, 86, or 21.9 per cent, were with Oklahoma firms. The combined group of graduates reported only 25.1 per cent with Oklahoma firms.

TABLE 42

NUMBER OF "ON CAMPUS" INTERVIEWS HAD BY TECHNICIAN GRADUATES WHO ACCEPTED EMPLOYMENT

	Type of Institution					
	Junior College		Tech Institute		Total	
Interviewed by:	No.	Pct.	No.	Pct.	No.	Pct.
Oklahoma Employers	19	73.1	86	21.9	105	25.1
Out-of-state Employers	7	26.9	306	78.1	313	74.9
TOTAL	26	100.0	392	100.0	418	100.0

The actual job offers made to junior college and technical institute graduates presented in Table 43 seems to be related to the out migration of technician manpower. The junior college graduates reported that of 45 job offers, 27, or 60.0 per cent, were with Oklahoma firms.

The technical institute graduates reported that of 215 job offers, 55, or only 25.6 per cent, were with Oklahoma firms. The combined group of graduates reported only 31.5 per cent of the offers came from Oklahoma firms. The evidence seems to indicate that technician manpower is out migrating in part, at least, as a response to a low percentage of job offers by Oklahoma employers.

TABLE 43

NUMBER OF ACTUAL JOB OFFERS MADE TO TECHNICIAN GRADUATES WHO ACCEPTED EMPLOYMENT

	Type of Institution					
	Junior College		Tech Institute		Total	
Job offers by:	No.	Pct.	No.	Pct.	No.	Pct.
Oklahoma Employers	27	60.0	55	25.6	82	31.5
Out-of-state Employers	18	40.0	160	74.4	178	68.5
TOTAL	45	100.0	215	100.0	260	100.0

An important consideration in what happens to technical program graduates is the number who desire some further education. Table 44 shows 50 of 74 junior college and 28 of 96 technical institute graduates who reported why they had not taken permanent employment by mid-September, 1967. Of the 50 junior college graduates, 39, or 78.0 per cent, reported they were going to reenter college. Of the 28 technical institute graduates, 23, or 82.1 per cent, were going on for further college work. Of the combined group of 78 graduates who had not taken permanent employment, 62, or 79.5 per cent, reported that they would reenter college.

TABLE 44

REASON NOT EMPLOYED

	Type of Institution					
	Junior College		Tech Institute		Total	
Reason:	No.	Pct.	No.	Pct.	No.	Pct.
Reentered college fall of 1967	39	78.0	23	82.1	62	79.5
On active duty with the military service	6	12.0	5	17.8	11	14.1
Have been unable to secure permanent employment	5	10.0	0	0.0	5	6.4
TOTAL	50	100.0	28	99.9	78	100.0

A follow-up questionnaire was forwarded to those technician graduates who reentered college in the fall of 1967. Forty-five of the 62, or 72.6 per cent, responded to the questionnaire. Of the junior college graduates, 57.7 per cent, as compared to 36.8 per cent, of the technical institute graduates expressed that they felt a need for additional training at this time to be successful as a technician. When asked to what extent the prospect of military service influenced their decision to reenter college, 57.7 per cent of the junior college as compared to 47.3 per cent of the technical institute graduates responded that the prospect of military service did have an influence on their decision to reenter college.

The number of technical institute and junior college graduates who reenter college may be a significant source of outstanding industrial teachers. The 45 technical institute and junior college graduates who stated they would reenter college primarily planned to enroll in industrial teacher education. Thirty-two, or 75.5 per cent, of the 42 listed technical, trade and industrial, and industrial arts as their program preference. The other 10, or 24.5 per cent, showed preference for science or engineering related programs.

The out-migration experience of technician manpower is not dissimilar to the 1965-1966 four year graduates. The Oklahoma State Regents for Higher Education are in the preliminary stages of a study which looks at, among other things, those graduates who plan to leave Oklahoma.[54] The Regents looked at a return of 1,872 from 2,765 graduates in the population of this study. Table 45 shows the number and distribution of the 1965-1966 graduates planning to leave Oklahoma following graduation. The 809 graduates of the 1,872 returns account for 43.2 per cent. Of the 809 graduates who planned to leave Oklahoma, 208, or 25.7 per cent, stated that the reason for leaving was better jobs.

TABLE 45

1965-1966 FOUR YEAR GRADUATES PLANNING TO LEAVE OKLAHOMA*

Reason for Leaving Oklahoma	Number	Per Cent
Better job elsewhere	208	25.7
Enroll in graduate school elsewhere	169	20.9
Plan to accompany spouse	130	16.1
Military duty	122	15.1
Prefer to live elsewhere	72	8.9
Going back to home state	46	5.7
Other	62	7.6
TOTAL	809	100.0

* Number and distribution of graduates from Oklahoma colleges planning to leave Oklahoma following graduation, 1965-1966.

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[54] Preliminary data from Oklahoma Regents for Higher Education.

Are out-of-state employers paying higher salaries to those graduates who out-migrate?

Data in Table 46 indicates the employers from out of state are starting technician graduates at higher salaries than are the employers from Oklahoma. Using salaries actually paid to technician graduates, the range indicates that out-of-state employers are paying from 14.3 per cent at the lower end of the range to 8.3 per cent at the upper end of the range more than in-state employers. In essence, the technician graduates who migrated out of state received, on the average, approximately 13 per cent more income to start with an out-of-state employer than did the technician graduates who remained in the state.

TABLE 46

MEDIAN AND RANGE OF ACTUAL SALARIES PAID TO TECHNICIAN GRADUATES

Employer:	Range Min. Max.	Average Salary (Mean)	Median Salary
In Oklahoma	$350-$600	$475	$475
Out-of-state	$400-$650	$536	$535
Difference ($)	$ 50-$ 50	$ 61	$ 60
Difference (%)	14.3- 8.3	12.8	12.6

In conclusion: Over half, or 56.8 per cent, of the Spring, 1967 graduating technicians who secured employment left Oklahoma for employment in another state. However, only 30.1 per cent of all the graduating technicians left Oklahoma. This represents a trained manpower drain which Oklahoma can ill afford in light of her stated goal of industrial development. The main reason given by the graduating technicians for accepting employment outside Oklahoma was lack of job opportunities. The evidence shows that Oklahoma employers are not as aggressive in terms of recruitment effort as out-of-state employers, assuming they have equal demand. For example, Oklahoma employers send less literature and interviewers to technical institutes than do out-of-state employers, although maintaining a favorable balance with junior college technical graduates. The same relationship holds for actual job offers made by Oklahoma employers as compared with out-of-state employers. A very important finding in this study relates to the fact that 81.6 per cent of those technicians leaving the state of Oklahoma would have remained if better job offers were available. Furthermore, 83.7 per cent definitely plan to return or wouldn't mind returning to Oklahoma. It should be noted that out-of-state employers do pay technicians who out-migrate an average of $60.00 more per month than Oklahoma employers. For more detail on employment practices of Oklahoma employers, see Chapter VIII.

CHAPTER VII

TECHNICIAN EMPLOYMENT PATTERNS

This chapter is concerned with estimating the number of technicians in specific standard industrial classifications and geographical areas of Oklahoma for purposes of educational planning. Technician employment patterns for the nation are reviewed as a necessary by-product of the analysis technique.

Educational planning for semiprofessional occupations is handicapped by a dearth of information as to the educational requirements for specific occupations. It is possible to obtain gross number estimates of the need for semiprofessional personnel in broad categories. Until December 1967, however, no accurate data were available on which to base estimates of the numbers within this category who need specific educational programs and training beyond high school. The preliminary findings of a study on employment practices of technical personnel in Oklahoma is reviewed in Chapter VIII. A section of that study is concerned with "how many 2-year post-high school technician graduates are needed in various technical fields by particular industrial classes." The methodology included conferences with Oklahoma employers and the results, although limited to particular technical fields, have excellent potential for educational planning.

Available data does indicate that only a small fraction of those presently employed in technician occupations have education to the associate degree level, although a majority of the technicians in the labor force do have some education beyond the high school. According to a recent BLS report:

> The growing educational attainment of technicians is illustrated by the fact that younger technicians have completed more schooling than older technicians. About two-thirds (65 per cent) of those 24 years of age or less had completed at least some college work, as contrasted with only about 45 per cent of those age 55 or older. Less than 6 per cent under 25 years of age reported that they had not completed high school, as compared with about 43 per cent 55 years of age or older. Although educational attainment differs among the various technician occupational groups, the differences apparantly are attributable to age rather than occupational specialty.[55]

Even if data were available on the educational background of technicians now in the work force, this kind of information would be a highly questionable base to use in estimating future educational needs. Industrial production, distribution, and service activities are increasing in complexity at an unprecedented rate. The knowledge and skills required for success in technical occupations have increased accordingly.

There seems to be little question that the nation's need for technical manpower is increasing at a much faster rate than the supply. The growth rate of technical occupations in Oklahoma during the next few years is expected to be greater than any other occupational group except for the professions. The Oklahoma Employment Security Commission estimates that employment in this category will increase from 35,003 employed in 1963 to 45,592 in 1975, an increase of 30.3 per cent.[56] Table 47 is an analysis of the Oklahoma Employment Security Commission's employment projection for engineers, scientists, and related engineering and scientific technicians from 1963 to 1975. The selection of engineering and science-related technician occupations was made from a listing of 24 classified technical occupations used by the Employment Security Commission. The 16 occupations selected were related to the engineering and scientific occupations shown in the table. These technician occupations usually require education beyond the secondary school level. Technical curricula in these 16 fields are quite common in technical schools throughout the country.

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[55] U.S., Bureau of Labor Statistics, Technician Manpower: Requirements, Resources, and Training Needs, (Washington: U.S. Government Printing Office, June 1966), Bulletin No. 1512, p. 25.

[56] Oklahoma Economic Security Commission, Manpower in Oklahoma, (Oklahoma City: December 1964).

The 16 engineering and science-related occupations employed 11,374 persons in 1963, and constituted 32.5 per cent of all technical occupations reported by the Employment Security Commission at that time. This percentage is significantly lower than is found for the nation as a whole. Nationally, about 50 per cent of all technician employment reported by the Bureau of Labor Statistices is in engineering and physical science-related occupations.[57]

The projected employment needs in these occupations for Oklahoma are also well below national projections. The expected growth of technician employment in Oklahoma for this group is 36.5 per cent. According to BLS estimates, technician employment will increase nationally 75 per cent during this same 12-year period.

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[57] U.S., Bureau of Labor Statistics, Technician Manpower: Requirements, Resources, and Training Needs, (Washington: U.S. Government Printing Office, June 1966), Bulletin No. 1512, p. 21.

TABLE 47

EMPLOYMENT OF ENGINEERS, SCIENTISTS, AND RELATED TECHNICIANS IN OKLAHOMA--1963 WITH PROJECTED EMPLOYMENT FOR 1975

	1963 Employment	Projected 1975 Employment	Per Cent Change 1963-1975
Engineers and Scientists:			
Chemist, Biological	94	106	12.8
Chemist, Industrial	497	596	19.9
Chemist, All Others	398	540	35.7
Engineer, Electrical or Electronic	1,856	3,719	100.4
Engineer, Civil	1,874	2,514	34.2
Engineer, Mechanical	1,564	2,656	69.8
Engineer, Quality Control	191	406	112.6
Engineer, All Other	4,072	5,524	35.7
Geologist, Petroleum	1,057	1,263	19.5
TOTALS	11,603	17,324	48.4
Technicians:			
Air Conditioning and Regrigeration Technician	449	569	26.7
Civil and Construction Technician	700	752	7.4
Cost Technician	359	443	23.4
Draftsman, Mechanical	603	1,064	76.5
Draftsman, All Others	2,670	4,108	53.9
Electronics Technician	1,809	2,501	38.8
Estimator (Manufacturing)	305	346	13.4
Estimator (Non-Manufacturing)	633	1,040	64.3
Industrial Technician	609	626	2.8
Instrument Man	362	440	21.5
Production Planner	1,274	1,539	20.8
Programmer, Data Processing	623	828	32.9
Project Planner, Data Processing	105	156	48.6
Quality Control Technician	578	724	25.3
Systems Analyst	206	274	33.0
Time Study Man	89	112	25.8
TOTALS	11,374	15,522	36.5

Source: Manpower in Oklahoma, Oklahoma Employment Security Commission, (Oklahoma City: December 1964), pp. 64-70.

It would seem logical, therefore, to base educational planning as much on national employment patterns as on Oklahoma patterns. Oklahoma's young people are entitled to educational opportunities on a par with those in any section of the country. Technical workers are no less mobile than other workers and, in a period of short supply, they are perhaps more mobile. Oklahoma firms must compete in the national labor market for technicians.

Another method for estimating current technician employment in Oklahoma is to use national percentages of technician employment by specific industry classes as established by the Bureau of Labor Statistics. Since this method can be applied to economic areas within the state as well as to the state as a whole, it provides perhaps the best source of data for educational planning. Before proceding to a discussion of how these estimates were derived, it is necessary to review the definition of technicians used in the BLS studies. The definitions used were:

> ....technicians directly or indirectly support scientists and engineers in designing, developing, producing, and maintaining machines and materials. In general, these technician jobs are technical in nature but more limited in scope than those of the engineer or scientist, and have a practical rather than a theoretical orientation.[58]

The report devotes a full chapter to discussing the problem of defining "technician" and describing five subcategories.

> Draftsmen--Draftsmen translate the ideas, rough sketches, specifications, and calculations of engineers, architects, and designers into exact working plans, using instruments such as compasses, dividers, protractors, and triangles, as well as machines that combine the functions of several instruments.[59]

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[58] Ibid., p. 11.

[59] Ibid., p. 12.

Engineering Technicians--Engineering technicians assist engineers in the application of basic scientific principles to the solution of practical engineering problems involved in creating a product or process. Engineering technicians usually specialize in one of the branches of engineering, such as aeronautical, civil, electrical, or mechanical engineering, and their specific duties and job titles usually vary according to the branch of engineering in which they specialize.[60]

Physical Science Technicians--Physical science technicians assist physical scientists and engineers in theoretical and applied research, and in solving practical problems. Generally, they work directly with physical scientists. Physical science technicians usually specialize in one branch of these sciences, usually chemistry, physics, or mathematics. In addition, a large number specialize in other physical science fields such as the earth sciences or metallurgy, or work in areas encompassing a combination of skills characteristic of several science disciplines. These other workers are designated in this report as "other" physical science technicians.[61]

Life Science Technicians--Included in the life science technician group are technicians engaged in tasks involving the study of life processes, and improvement of health and agricultural productivity. Three of the major life science technician occupations are agricultural technician, biological technician, and medical technician.[62]

Other Technicians--In addition to the technicians previously described, there are other groups of technicians who work with scientists and engineers, including computer programmers, surveyors, and industrial designers.[63]

Referring to the estimate of technician employment in Table 48, it is interesting to note that the figure of 830,000 does not differ strikingly from the estimates of technician employment in 1960 of 875,000 appearing in the National Science Foundation's "Profiles of Manpower in Science and Technology."[64]

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[60] Ibid., p. 13.

[61] Ibid., p. 16.

[62] Ibid., p. 18.

[63] Ibid., p. 19.

[64] National Science Foundation, Washington, D. C., 1963, p. 18.

TABLE 48

ESTIMATED EMPLOYMENT OF TECHNICIANS AND TOTAL NONAGRICULTURAL EMPLOYMENT, BY SELECTED INDUSTRY CLASS, UNITED STATES, 1963

SIC code	Industry	Employees, total, 1963 (000)	Draftsmen	Engineering and physical science technicians	Life science technicians	Other technicians	Total
- - -	All industries	57,174	232,000	439,000	58,100	115,700	844,800
- - -	Mining (including petroleum)	634	4,000	6,700	100	3,000	13,800
- - -	Construction	3,029	13,700	11,000	200	4,600	29,500
- - -	Manufacturing	17,035	122,800	207,500	8,900	50,600	389,700
19	Ordnance and accessories	277	4,500	12,800	a	1,900	19,300
20	Food and kindred products	1,738	700	5,700	2,300	2,400	11,100
22, 23	Textile mill products and apparel	2,188	300	1,500	a	1,200	2,900
24, 25	Lumber and furniture	976	4,300	1,600	400	2,700	9,000
26	Paper and allied products	621	2,000	3,400	100	900	6,400
28	Chemicals and allied products	866	3,300	24,500	4,300	6,200	38,400
29	Petroleum refining and products of petroleum and coal	188	1,100	4,200	100	1,400	6,700
30	Rubber products	409	1,400	3,000	a	1,000	5,500
32	Stone, clay and glass products	608	1,500	2,700	a	1,500	5,800
33	Primary metal products	1,166	4,100	9,800	100	2,500	16,500
34	Fabricated metal products	1,153	16,700	6,600	a	3,000	26,300
35	Machinery, except electrical	1,520	28,300	25,700	100	7,600	61,700
36	Electrical equipment	1,582	27,400	64,000	100	7,300	98,800
372	Aircraft and parts	649	9,000	22,300	100	3,800	35,200
371	Motor vehicles and equipment	738	6,100	5,200	100	2,100	13,500
373, 374, 375, 379	Other transportation equipment	227	4,500	1,900	a	300	6,700
38	Professional and scientific instruments	372	5,200	10,800	900	3,700	20,600
21, 27, 31, 39	Miscellaneous manufacturing	1,760	2,500	1,800	100	1,100	5,400
- - -	Transportation, communication and electric, gas and sanitary services	3,913	7,900	37,200	300	9,900	55,200
40, 41, 42, 44, 45, 46, 47	Transportation	2,472	2,100	3,900	100	2,100	8,200

(Continued)

TABLE 48 (Continued)

ESTIMATED EMPLOYMENT OF TECHNICIANS AND TOTAL NONAGRICULTURAL EMPLOYMENT, BY SELECTED INDUSTRY CLASS, UNITED STATES, 1963

SIC code	Industry	Employees, total, 1963 (000)	Draftsmen	Engineering and physical science technicians	Life science technicians	Other technicians	Total
48	Communication	829	800	23,500	a	4,900	29,200
49	Electric, gas and sanitary services	612	5,000	9,900	200	2,900	17,900
- - -	Other industries	23,028	59,300	66,700	25,500	35,300	176,800
73	Miscellaneous business services	981	11,300	20,300	1,100	6,400	39,100
807	Medical and dental laboratories	34	a	a	15,800	400	16,200
86	Nonprofit organizations	769	1,600	7,900	3,600	100	13,100
891	Engineering and architectural services	204	43,300	11,500	a	13,400	68,200
residual class	All other nonmanufacturing	21,040	3,100	27,000	5,000	5,000	40,100
- - -	Government	9,535	22,300	105,700	19,500	22,300	169,800
91	Federal government	2,358	5,500	54,700	13,300	5,200	78,700
92	State governments	1,772	6,500	31,700	5,500	15,700	59,400
93	Local governments	5,405	10,300	19,300	700	1,400	31,600
822	Colleges and universities	n. a.	2,000	4,300	3,700	100	10,000

[a] less than 50 cases

Source: This is from Technician Manpower: Requirements, Resources, and Training Needs, U. S. Department of Labor, Bureau of Labor Statistics, Bulletin No. 1512 (June, 1966), page 24. Because of rounding, the sum of subcomponent estimates in this table do not always equal the total estimate. Standard Industrial Classification (SIC) numbers were assigned to the industry titles in this table.

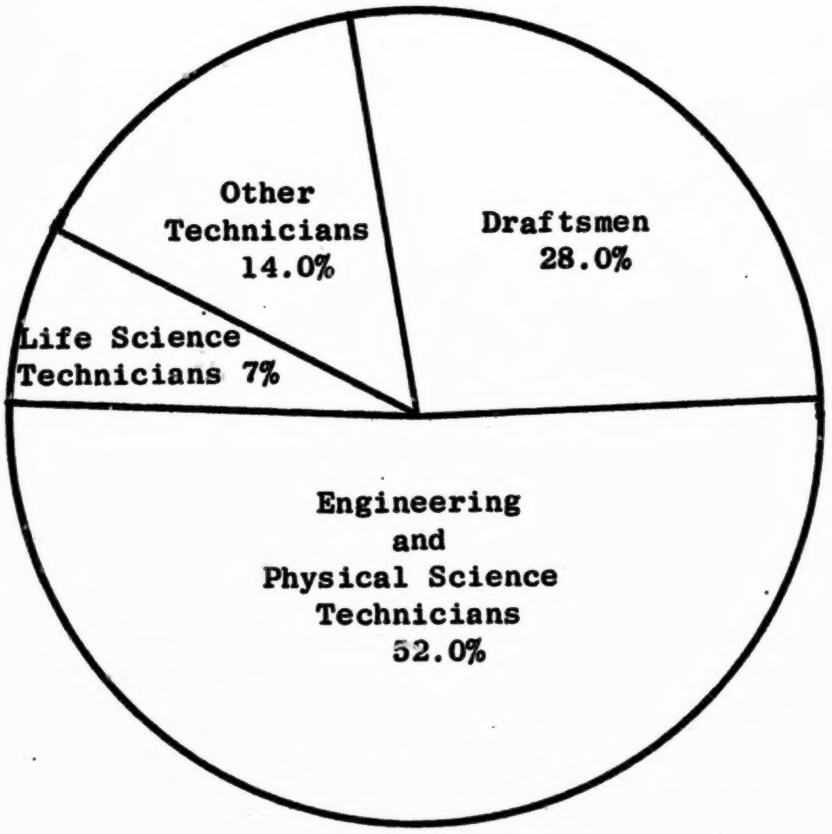


Figure 16. Distribution of Technicians by Types in Total Nonagricultural Employment, United States, 1963.

Source: Technician Manpower, Requirements, Resources and Training Needs, Bulletin No. 1512, U. S. Department of Labor, Government Printing Office.

If this estimate of technician employment for the United States is compared with total employment for the various industry categories, it is possible to obtain a set of ratios showing technician employment as a per cent of total employment. These ratios are presented in Table 49. Note that there is considerable variation in the ratios, with some industry groups making relatively much more intensive use of certain types of technicians than is the case with other industry groups.

The accuracy of the ratios in Table 49 is subject to at least two potential sources of error. First, there may be error associated with original estimates. Second, some difficulties were encountered in fitting national employment data by industry class in with the industry classes reported in these estimates. For example, it proved impossible to develop meaningful ratios for technician employment in the colleges and universities category, because much college and university employment is buried within the government sector. It is very important that the user of this report be familiar with the detailed description of data sources and estimating procedures presented in Appendix A.

In order to develop estimates of technician employment for the state of Oklahoma, it was assumed that the national ratios of technician to total employment in Table 49 were applicable to industry in Oklahoma. By applying these ratios to estimates of employment for the various industry groups reported primarily in County Business Patterns, it was possible to develop the very rough estimates of technician employment for the state as a whole and for the Oklahoma City and Tulsa Standard Metropolitan Statistical Areas presented in Tables 50, 51, and 52. It must be emphasized that although the estimates are not rounded in any way, there is considerable latitude for error. It is quite clear, for

TABLE 49

TECHNICIANS AS A PERCENT OF TOTAL EMPLOYMENT, BY SELECTED INDUSTRY CLASS, UNITED STATES, 1963

SIC code	Industry	Percent of total employment				
		Draftsmen	Engineering and physical science technicians	Life science technicians	Other technicians	Total
- - -	All industries	0.41	0.77	0.10	0.20	1.48
- - -	Mining (including petroleum)	0.63	1.06	0.02	0.47	2.18
- - -	Construction	0.45	0.36	0.01	0.15	0.97
- - -	Manufacturing	0.72	1.22	0.05	0.30	2.29
19	Ordnance and accessories	1.62	4.62	a	0.69	6.97
20	Food and kindred products	0.04	0.33	0.13	0.14	0.64
22, 23	Textile mill products and apparel	0.01	0.07	a	0.05	0.13
24, 25	Lumber and furniture	0.44	0.16	0.04	0.28	0.92
26	Paper and allied products	0.32	0.55	0.02	0.14	1.03
28	Chemicals and allied products	0.38	2.83	0.50	0.72	4.43
29	Petroleum refining and products of petroleum and coal	0.59	2.23	0.05	0.74	3.56
30	Rubber products	0.34	0.73	a	0.24	1.34
32	Stone, clay and glass products	0.25	0.44	a	0.25	0.95
33	Primary metal products	0.35	0.84	0.01	0.21	1.42
34	Fabricated metal products	1.45	0.57	a	0.26	2.28
35	Machinery, except electrical	1.86	1.69	0.01	0.50	4.06
36	Electrical equipment	1.73	4.05	0.01	0.46	6.25
372	Aircraft and parts	1.39	3.44	0.02	0.59	5.42
371	Motor vehicles and equipment	0.83	0.70	0.01	0.28	1.83
373, 374, 375, 379	Other transportation equipment	1.98	0.84	a	0.13	2.95
38	Professional and scientific instruments	1.40	2.90	0.24	0.99	5.54
21, 27, 31, 39	Miscellaneous manufacturing	0.14	0.10	0.01	0.06	0.31

(Continued)

TABLE 49 (Continued)

TECHNICIANS AS A PERCENT OF TOTAL EMPLOYMENT, BY SELECTED INDUSTRY CLASS, UNITED STATES, 1963

SIC code	Industry	Percent of total employment				
		Draftsmen	Engineering and physical science technicians	Life science technicians	Other technicians	Total
- - -	Transportation, communication and electric, gas and sanitary services	0.20	0.95	0.01	0.25	1.41
40, 41, 42, 44, 45, 46, 47	Transportation	0.08	0.16	0.00	0.08	0.33
48	Communication	0.10	2.83	[a]	0.59	3.52
49	Electric, gas and sanitary services	0.82	1.62	0.03	0.47	2.92
- - -	Other industries	0.26	0.29	0.11	0.15	0.77
73	Miscellaneous business services	1.15	2.06	0.11	0.65	3.99
807	Medical and dental laboratories	[a]	[a]	46.47	1.18	47.65
86	Nonprofit organizations	0.21	1.03	0.47	0.01	1.70
891	Engineering and architectural services	21.23	5.64	[a]	6.57	33.43
residual class	All other nonmanufacturing	0.01	0.13	0.02	0.02	0.19
- - -	Government	0.23	1.11	0.20	0.23	1.78
91	Federal government	0.23	2.32	0.56	0.22	3.34
92	State governments	0.37	1.79	0.31	0.88	3.35
93	Local governments	0.19	0.36	0.01	0.03	0.58
822	Colleges and universities	- - -	- - -	- - -	- - -	- - -

[a] less than 50 cases

Source: See Table 6.

example, that the composition of business establishments in a given SIC class in the state of Oklahoma may be somewhat different from that of the industry class for the nation as a whole. There is no way of inferring whether this condition gives a systematic bias toward either over- or under-estimating the number of technicians. At least two instances can be pointed to, however, in which the procedure utilized may be biased toward under-statement. The original BLS estimate did not include the industry class entitled "Administrative and Auxiliary" as appears in the County Business Patterns report. There is thus no way of deriving ratios of technicians to total employees for such establishments. These establishments, however, refer to central administrative offices and auxiliary units such as warehouses, research laboratories, and maintenance locations. The procedure utilized to develop estimates of employment in Tables 50, 51, and 52 for these categories was to utilize the ratios applying to the major industry class. For example, the estimates of technicians required for the administrative and auxiliary class under manufacturing utilized the overall ratios of technicians to employment in the manufacturing sector. Because of the concentration of central administrative office for petroleum firms with the state, it is probable that using the overall national ratios for manufacturing understates the true utilization of technicians in these installations. A second case probably involves an understatement of the employment of draftsmen, and engineering and physical science technicians in the government class. Close to half of the state's federal employees work at the repair and maintenance facilities at Tinker Air Force Base in Oklahoma City. For this group, the much higher ratios observed in Table 49 under SIC Code 372 (aircraft and parts) might be more applicable.

TABLE 50

ESTIMATED EMPLOYMENT OF TECHNICIANS AND TOTAL EMPLOYMENT AS REPORTED IN COUNTY BUSINESS PATTERNS,[a] BY INDUSTRY CLASS, OKLAHOMA, MARCH, 1965

SIC code	Industry	Employees	Draftsmen	Engineering and physical science technicians	Life science technicians	Other technicians	Total
- - -	All industries	622,929	2,440	5,010	765	1,388	9,603
- - -	Mining (including petroleum)	32,088	202	340	6	151	699
- - -	Construction	34,090	153	123	3	51	330
- - -	Manufacturing	106,467	860	1,398	38	343	2,639
19	Ordnance and accessories	4,119	67	190	---	28	285
20	Food and kindred products	13,148	5	43	17	18	83
22, 23	Textile mill products and apparel	6,364	1	4	---	3	8
24, 25	Lumber and furniture	3,477	15	6	1	10	32
26	Paper and allied products	935	3	5	---	1	9
28	Chemicals and allied products	1,168	4	33	6	8	51
29	Petroleum refining and products of petroleum and coal	5,791	34	129	3	43	209
30	Rubber products	2,906	10	21	---	7	38
32	Stone, clay and glass products	7,165	18	32	---	18	68
33	Primary metal products	4,003	14	34	---	8	56
34	Fabricated metal products	9,917	144	57	---	26	227
35	Machinery, except electrical	11,709	218	198	1	59	476
36	Electrical equipment	7,158	124	290	1	33	448
372	Aircraft and parts	4,838	67	166	1	29	263
371	Motor vehicles and equipment	1,591	13	11	---	4	28
374, 379	Other transportation equipment	741	15	6	---	1	22
38	Professional and scientific instruments	380	5	11	1	4	21
27, 31, 39	Miscellaneous manufacturing	8,431	12	8	1	5	26
- - -	Administrative and auxiliary	12,626	91	154	6	38	289
- - -	Transportation, communication and electric, gas and sanitary services	40,269	105	463	3	119	690

(Continued)

TABLE 50 (Continued)

ESTIMATED EMPLOYMENT OF TECHNICIANS AND TOTAL EMPLOYMENT AS REPORTED IN COUNTY BUSINESS PATTERNS,[a] BY INDUSTRY CLASS, OKLAHOMA, MARCH, 1965

SIC code	Industry	Employees	Draftsmen	Engineering and physical science technicians	Life science technicians	Other technicians	Total
41, 42, 45, 46, 47	Transportation	20,494	16	33	---	16	65
48	Communication	9,442	9	267	---	56	332
49	Electric, gas and sanitary services	9,636	79	156	3	45	283
- - -	Administrative and auxiliary	697	1	7	---	2	10
- - -	Other industries	263,077	758	728	335	301	2,122
73	Miscellaneous business services	7,709	87	159	8	50	304
807	Medical and dental laboratories	515	-----	-----	239	6	245
86	Nonprofit organizations	8,289	17	85	39	1	142
891	Engineering and architectural services	2,967	630	167	---	195	992
residual class	All other nonmanufacturing	243,597	24	317	49	49	439
- - -	Government	148,300	362	1,958	380	423	3,123
91	Federal government	48,100	111	1,116	269	106	1,602
92	State governments	33,700	125	603	104	297	1,129
93	Local governments	66,500	126	239	7	20	392

[a] Plus estimated government employment

Source: See Appendix A.

TABLE 51

ESTIMATED EMPLOYMENT OF TECHNICIANS AND TOTAL EMPLOYMENT AS REPORTED IN COUNTY BUSINESS PATTERNS,[a] INDUSTRY CLASS, OKLAHOMA CITY STANDARD METROPOLITAN STATISTICAL AREA, MARCH, 1965

SIC code	Industry	Employees, total, 1965	Draftsmen	Engineering and physical science technicians	Life science technicians	Other techni-cians	Total
- - -	All industries	205,268	967	1,951	309	510	3,737
- - -	Mining (including petroleum)	4,987	31	53	1	23	108
- - -	Construction	13,569	61	49	1	20	131
- - -	Manufacturing	26,797	257	413	9	84	763
19	Ordnance and accessories	-------	---	-----	---	---	-----
20	Food and kindred products	4,657[b]	2	15	6	7	30
22, 23	Textile mill products and apparel	470	---	-----	---	---	-----
24, 25	Lumber and furniture	1,047[b]	5	2	---	3	10
26	Paper and allied products	247	1	1	---	---	2
28	Chemicals and allied products	291	1	8	1	2	12
29	Petroleum refining and products of petroleum and coal	218	1	5	---	2	8
30	Rubber products	118[b]	---	1	---	---	1
32	Stone, clay and glass products	1,026	3	5	---	3	11
33	Primary metal products	104	---	1	---	---	1
34	Fabricated metal products	3,141	46	18	---	8	72
35	Machinery, except electrical	2,432	45	41	---	12	98
36	Electrical equipment	5,321[b]	92	216	1	24	333
372	Aircraft and parts	1,936[b]	27	67	---	11	105
371	Motor vehicles and equipment	1,255[b]	10	9	---	4	23
374, 379	Other transportation equipment	492[b]	10	4	---	1	15
38	Professional and scientific instruments	62	1	2	---	1	4
27, 31, 39	Miscellaneous manufacturing	2,749	4	3	---	2	9
- - -	Administrative and auxiliary	1,231	9	15	1	4	29
- - -	Transportation, communication and electric, gas and sanitary services	12,579	32	155	1	39	227

(Continued)

TABLE 51 (Continued)

ESTIMATED EMPLOYMENT OF TECHNICIANS AND TOTAL EMPLOYMENT AS REPORTED IN COUNTY BUSINESS PATTERNS,[a] INDUSTRY CLASS, OKLAHOMA CITY STANDARD METROPOLITAN STATISTICAL AREA, MARCH, 1965

SIC code	Industry	Employees, total, 1965	Draftsmen	Engineering and physical science technicians	Life science technicians	Other techni-cians	Total
41, 42, 45, 46, 47	Transportation	6,216	5	10	---	5	20
48	Communication	3,426	3	97	---	20	120
49	Electric, gas and sanitary services	2,937	24	48	1	14	87
- - -	Administrative and auxiliary	-------	---	-----	---	---	-----
- - -	Other industries	91,036	444	307	88	159	998
73	Miscellaneous business services	2,928	34	60	3	19	116
807	Medical and dental laboratories	112[b]	---	-----	52	1	53
86	Nonprofit organizations	3,339	7	34	16	---	57
891	Engineering and architectural services	1,859[b]	395	105	---	122	622
residual class	All other nonmanufacturing	82,798	8	108	17	17	150
- - -	Government	56,300	142	974	209	185	1,510
91	Federal government	29,841	69	692	167	66	994
92	State governments	13,079[b]	48	234	41	115	438
93	Local governments	13,380	25	48	1	4	78

[a] Plus estimated government employment

[b] Estimated: see Appendix A.

Source: See Appendix A.

TABLE 52

ESTIMATED EMPLOYMENT OF TECHNICIANS[a] AND TOTAL EMPLOYMENT AS REPORTED IN COUNTY BUSINESS PATTERNS, BY SELECTED INDUSTRY CLASS, TULSA STANDARD METROPOLITAN STATISTICAL AREA, MARCH, 1965

SIC code	Industry	Employees, total, 1965	Draftsmen	Engineering and physical science technicians	Life science technicians	Other technicians	Total
- - -	All industries	146,563	700	1,104	211	306	2,321
- - -	Mining (including petroleum)	9,577	60	102	2	45	209
- - -	Construction	9,051	41	33	1	14	89
- - -	Manufacturing	35,799	370	559	12	134	1,075
19	Ordnance and accessories	2,785[b]	45	129	---	19	193
20	Food and kindred products	2,489	1	8	3	3	15
22, 23	Textile mill products and apparel	750[b]	---	1	---	---	1
24, 25	Lumber and furniture	492[b]	2	1	---	1	4
26	Paper and allied products	206[b]	1	1	---	---	2
28	Chemicals and allied products	503[b]	2	14	3	4	23
29	Petroleum refining and products of petroleum and coal	1,714	10	38	1	13	62
30	Rubber products	431	1	3	---	1	5
32	Stone, clay and glass products	2,636[b]	7	12	---	7	26
33	Primary metal products	1,713[b]	6	14	---	4	24
34	Fabricated metal products	5,939	86	34	---	15	135
35	Machinery, except electrical	5,264	98	89	1	26	214
36	Electrical equipment	1,463	25	59	---	7	91
372	Aircraft and parts	2,337[b]	32	80	---	14	126
371	Motor vehicles and equipment	-------[b]	---	-----	---	---	-----
374, 379	Other transportation equipment	555[b]	11	5	---	1	17
38	Professional and scientific instruments	256	4	7	1	3	15
27, 31, 39	Miscellaneous manufacturing	1,169[b]	2	2	---	1	5
- - -	Administrative and auxiliary	5,097[b]	37	62	3	15	117
- - -	Transportation, communication and electric, gas and sanitary services	13,669	25	107	1	29	162

(Continued)

TABLE 52 (Continued)

ESTIMATED EMPLOYMENT OF TECHNICIANS AND TOTAL EMPLOYMENT AS REPORTED IN COUNTY BUSINESS PATTERNS,[a] BY SELECTED INDUSTRY CLASS, TULSA STANDARD METROPOLITAN STATISTICAL AREA, MARCH, 1965

SIC code	Industry	Employees, total, 1965	Draftsmen	Engineering and physical science technicians	Life science technicians	Other techni-cians	Total
41, 42, 45, 46, 47	Transportation	9,367	7	15	---	7	29
48	Communication	2,046	2	58	---	12	72
49	Electric, gas and sanitary services	1,849	15	30	1	9	55
- - -	Administrative and auxiliary	407	1	4	---	1	6
- - -	Other industries	64,167	175	183	175	73	606
73	Miscellaneous business services	2,140	25	44	2	14	85
807	Medical and dental laboratories	320[b]	---	-----	149	4	153
86	Nonprofit organizations	2,515[b]	5	26	12	---	43
891	Engineering and architectural services	653[b]	139	37	---	43	219
residual class	All other nonmanufacturing	58,539	6	76	12	12	106
- - -	Government	14,300	29	120	20	11	180
91	Federal government	3,372	8	78	19	7	112
92	State governments	142	1	3	---	1	5
93	Local governments	10,786	20	39	1	3	63

[a] Plus estimated government employment

[b] Estimated: see Appendix A.

Source: See Appendix A.

From Table 50 it can be inferred, subject to the warnings above, that there are between nine and ten thousand technicians employed in Oklahoma. The relative importance of the four categories of technicians for the state does not differ significantly from that of the nation as a whole as described in Table 48. Roughly half of the technicians fall in the engineering and physical science group, one-quarter are draftsmen, about 15 per cent fall into the "other" category, and the remaining 7 or 8 per cent are associated with the life science field. It is probable, however, that the actual volume of employed people trained in the life science technician field is greater than indicated in Table 50.

As Tables 51 and 52 indicate, heavy concentrations in the employment of technicians are found in the state's two major urban areas--the Oklahoma City Standard Metropolitan Statistical Area (Oklahoma, Cleveland, and Canadian counties) and the Tulsa SMSA (Tulsa, Creek, and Osage counties) account for almost two-thirds of the estimated employment of technicians. This same general concentration of employment in the two SMSA's is repeated for the four separate technician categories. Within the two SMSA's can be found approximately 70 per cent of the draftsmen, 60 per cent of the engineering and physical science technicians, two-thirds of the life science technicians, and slightly over 55 per cent of the "other" technicians. Approximately half of all the state's estimated technicians are draftsmen and engineering and physical science technicians working in the two metropolitan areas. The rough details concerning the way in which the four categories of technicians are distributed between the two metropolitan areas and the rest of the state are presented in Table 53 and Figure 17.

Employment Patterns and Trends for the State and for its Regions

In the preceding section a technique was suggested for estimating the number and concentration of technicians employed in the state. The focus was on the state as a whole and the two Standard Metropolitan Statistical Areas. In this section employment patterns are presented for the state and a set of multicounty regions referred to as State Economic Areas (SEA's). Total employment data are presented by broad industrial source for twelve SEA's for the years 1940, 1950, and 1960 (Table 54). The change in employment between 1950 and 1960 by broad industrial class for each economic area is presented in Table 55. Past employment patterns provide information relative to the need for technicians in the different areas of the state and in the various industries within these areas.

Data discussed below are derived from the household surveys of the decennial censuses of population. Thus employment data apply to individual's places of residence rather than to the location of the establishments where they work.

Summary of Employment Patterns in the State

The new increase in employment for the state during the decade of the fifties was slightly over fifty thousand. However, the economic areas outside of the Oklahoma City and Tulsa SMSA's experienced a decline in employment of 26,115, while total employment increased in the two metropolitan areas by 76,864.

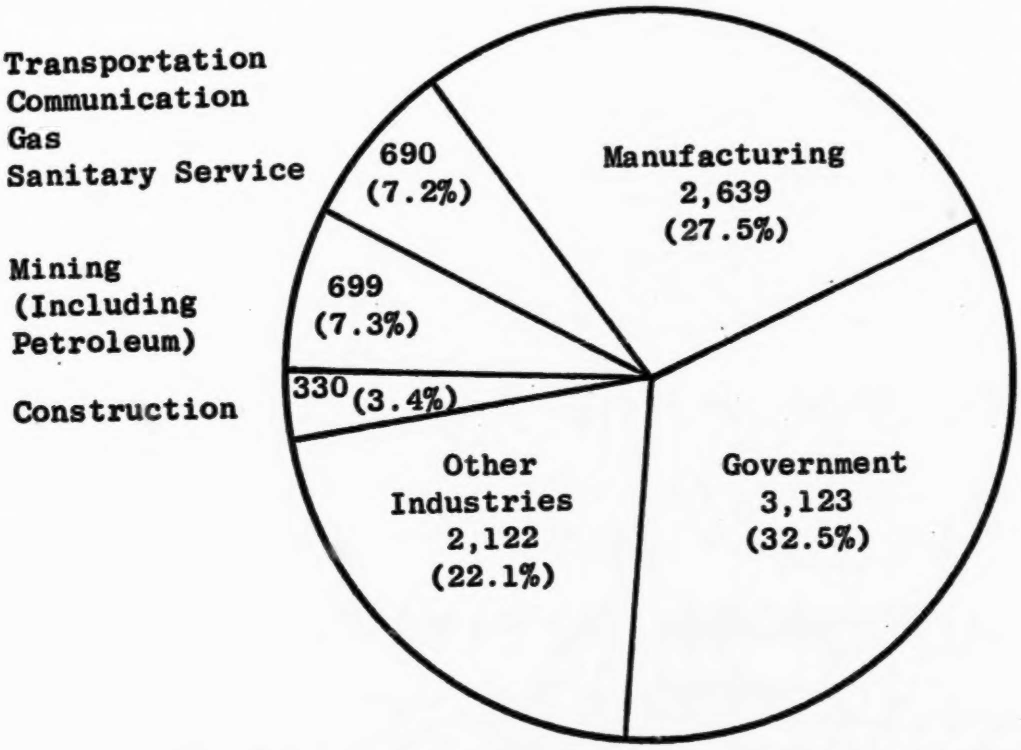
The state experienced a very large decrease in agricultural (farming) employment during this period. Agricultural employment declined by 81,298, with most of this contraction (75,107) occurring in the nonmetropolitan areas of the state.

TABLE 53

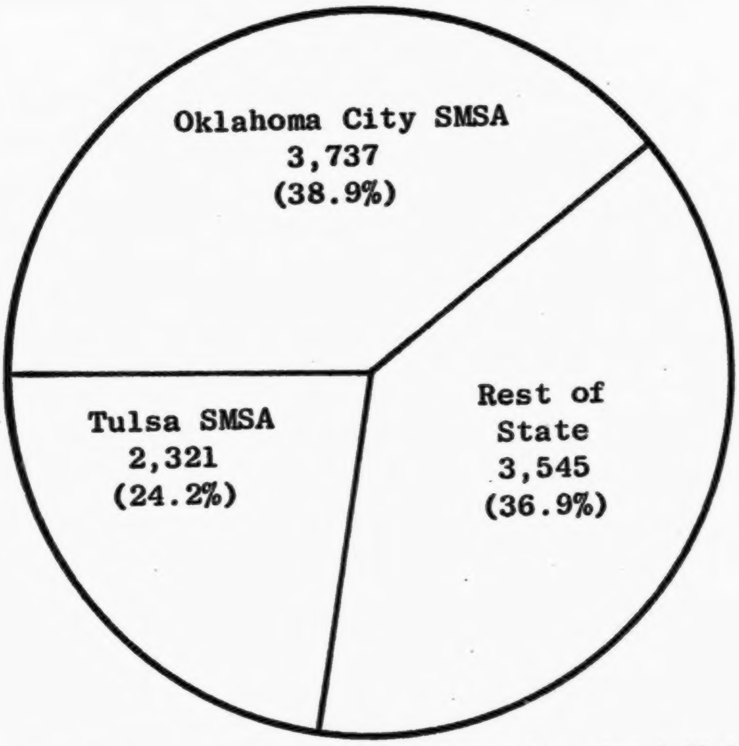
DISTRIBUTION OF ESTIMATED TECHNICIANS EMPLOYED BY TECHNICIAN CLASS AND METROPOLITAN AREA, OKLAHOMA, MARCH, 1963

	PERCENT				
	Draftsmen	Engineering and Physical Science Technician	Life Science Technician	Other Technician	Total
Oklahoma City SMSA	10	20	3	6	39
Tulsa SMSA	7	11	2	3	23
Rest of State	8	20	3	7	38
TOTALS	25	51	8	16	100

Source: Tables 50, 51, and 52.



Estimated Employment of Technicians by Major Industry Class, Oklahoma, March, 1965*



Estimated number of Technicians Employed in Standard Metropolitan Statistical Areas, (SMSA) Oklahoma, (Tulsa and Oklahoma City), 1963**

Figure 17. Employment of Technicians in Oklahoma.

Source: * County Business Patterns, 1965, Oklahoma CBP-65-38, U. S. Bureau of Census (Washington: U. S. Government Printing Office, 1966), p. 72.

** Technician Manpower, Requirements, Resources and Training Needs, bulletin No. 1512, U. S. Department of Labor, (Washington: Government Printing Office). (See Tables 50, 51, and 52).

TABLE 54

TOTAL EMPLOYMENT BY INDUSTRY CLASS,[a] BY AREAS OF OKLAHOMA; 1940, 1950, 1960

Area	Year	Agriculture, Forestry, and Fisheries	Mining	Construction	Manufacturing	Finance, Insurance and Real Estate	Transportation	Communications and Public Utility	Wholesale and Retail Trade	Services	Government	Other	Total
Panhandle (SEA 1)	1940	17553	72	1504	822	474	841	487	5050	5531	1064	341	33739
	1950	15135	470	3169	1234	665	1341	1076	6358	6476	1230	744	37898
	1960	9895	1282	2687	1343	817	1200	1266	7250	7834	1496	1218	36288
North Central (SEA 2)	1940	20378	1394	2500	5249	1118	1688	1001	9763	10211	1438	1013	55753
	1950	17519	1297	4273	7915	1425	2116	1635	12634	10625	2487	3468	65394
	1960	10036	1082	3495	9519	1765	1861	1384	11783	12063	2804	3253	59045
Northeast (SEA 3)	1940	12999	6530	2644	2493	674	1209	548	5784	7157	1053	860	41951
	1950	9800	5978	3773	4355	918	1436	1174	7318	7569	1404	1038	44763
	1960	4189	4970	3678	7625	1247	1447	1447	8340	9164	1564	1583	45254
Southwest (SEA 4)	1940	33601	857	2200	2518	1116	1516	936	11373	12050	1732	6084	73983
	1950	26723	2105	5412	3271	1568	2064	1826	15079	13518	3242	9887	84695
	1960	14783	1490	5923	4309	2078	2142	2214	16179	16080	5659	28584	99441
Central Oklahoma-Western (SEA 5)	1940	23436	2538	1941	2955	1024	1952	834	9038	10691	1752	1009	57150
	1950	14484	3927	4710	3892	1267	2452	1558	11071	13829	2961	1754	61905
	1960	6613	4266	4465	5035	1511	2314	1781	11218	14565	4193	2173	58134
Central Oklahoma-Eastern (SEA 6)	1940	16394	5130	1357	2203	689	1192	571	6812	7771	958	627	43704
	1950	9231	4222	2288	2081	690	1253	890	6438	6424	1177	755	35449
	1960	3098	2529	2150	2797	686	888	809	5746	5836	1361	898	26798
South Central (SEA 7)	1940	24443	2350	1761	1716	867	1353	651	7787	9099	1351	727	52105
	1950	14404	5420	3579	2675	988	1885	1327	9840	9161	1789	1420	52488
	1960	6349	4436	3843	5933	1372	1755	1294	10670	11115	2105	1492	50364
Eastern Oklahoma-Arkansas River (SEA 8)	1940	21524	1485	1393	3300	888	1658	699	7388	8692	1505	923	49455
	1950	14299	1334	3667	6342	1095	2145	1361	9449	9920	2135	1021	52768
	1960	4869	974	3220	7767	1276	1645	1243	9105	10374	2237	1933	44643
Ouachita Mountains-Western (SEA 9)	1940	20603	878	1129	4159	388	1191	351	4689	5942	1145	608	41083
	1950	13449	1062	2295	4342	525	1551	724	6070	6273	2577	715	39583
	1960	4576	738	2393	4878	590	953	722	6164	6711	2126	906	30757
Oklahoma Ozark (SEA 10)	1940	7831	35	603	867	79	222	58	993	1499	262	209	12658
	1950	6584	30	920	639	117	266	145	1404	1876	367	318	12666
	1960	2113	11	1256	978	168	284	225	2018	2579	448	690	10770
Tulsa SMSA (SEA A and SEA C)	1940	10704	9875	4661	13404	4070	4382	2173	19903	22052	2601	1535	95360
	1950	6751	9004	10547	21727	5531	8298	4047	28182	24716	3404	1905	124112
	1960	3234	8957	9965	31431	7376	10333	5110	33385	33284	4825	8298	156198
Oklahoma City SMSA (SEA B and SEA D)	1940	8859	3865	5165	11072	5637	5014	2835	25003	26743	5379	2215	101787
	1950	6777	4762	13717	15646	7572	7587	5768	36528	34719	17951	4610	155637
	1960	4103	4394	13618	22519	10247	7432	6179	43306	45634	26614	16369	200415
The State	1940	218325	35009	26858	50758	17024	22218	11144	113583	127438	20240	16151	658748
	1950	155156	39611	58350	74119	22361	32394	21531	150371	145106	40724	27635	767358
	1960	73858	35129	56693	104134	29133	32254	23674	165164	175239	55432	67397	818107

Source: U.S. Department of Commerce, Growth Patterns in Employment by County, 1940-1950 and 1950-1960 (Washington: U.S. Government Printing Office, 1967) Vol. VI, Table 7.

[a] Industry class as used in this table is compared to industry class used in Growth Patterns and S.I.C. Codes in Appendix

TABLE 55

TOTAL CHANGE IN EMPLOYMENT BY INDUSTRY CLASS,[a]
BY AREAS OF OKLAHOMA 1950-1960

Area	Agriculture, Forestry, and Fisheries	Mining	Construction	Manufacturing	Finance, Insurance and Real Estate	Transportation	Communications and Public Utility	Wholesale and Retail Trade	Services	Government	Other	Total
Panhandle (SEA 1)	-5240	812	-482	109	152	-141	190	892	1358	266	474	-1610
North Central (SEA 2)	-7483	-215	-778	1604	340	-255	-251	-851	1438	317	-215	-6349
Northeast (SEA 3)	-5611	-1008	-95	3270	329	11	273	1022	1595	160	545	491
Southwest (SEA 4)	-11940	-615	511	1038	510	78	388	1100	2562	2417	18697	14746
Central Oklahoma-Western (SEA 5)	-7871	339	-245	1143	244	-138	223	147	736	1232	419	-3771
Central Oklahoma-Eastern (SEA 6)	-6133	-1693	-138	716	-4	-365	-81	-692	-588	184	143	-8651
South Central (SEA 7)	-8055	-984	264	3258	384	-130	-33	830	1954	316	72	-2124
Eastern Oklahoma-Arkansas River (SEA 8)	-9430	-360	-447	1425	181	-500	-118	-344	454	102	912	-8125
Ouachita Mountains-Western (SEA 9)	-8873	-324	98	536	65	-598	-2	94	438	-451	191	-8826
Oklahoma Ozark (SEA 10)	-4471	-19	336	339	51	18	80	614	703	81	372	-1896
Tulsa SMSA (SEA A and SEA C)	-3517	-47	-582	9704	1845	2035	1063	5203	8568	1421	6393	32086
Oklahoma City SMSA (SEA B and SEA D)	-2674	-368	-99	6873	2675	-155	411	6778	10915	8663	11759	44778
Total for the State	-81298	-4482	-1657	30015	6772	-140	2143	14793	30133	14708	39762	50749

Source: Table

[a] Industry class as used in this table is compared to industry class used in Growth Patterns and S.I.C. Codes in Appendix

Manufacturing employment rose by 30,105 during 1950-1960. The areas other than the two SMSA's experienced an increase of 13,438 in this category, half of which occurred in the Northeast (SEA 3) and South Central (SEA 7) areas. The two metropolitan areas realized an increase of 16,577 in manufacturing employment.

Employment in services increased by 30,133 between 1950 and 1960. A very large part of this occurred in the "medical, and other professional services" category. (See Appendix C for a comparison of industry class as used in this report with the standard Industrial Classification Codes.)

Government employment expanded by 14,708 during the fifties. Approximately 60 per cent of this expansion was realized in the Oklahoma City metropolitan area.

Over one-half of the increase in employment in the "other" category came about outside of the two metropolitan areas. Most of this expansion was in the "armed forces" category in Comanche County where Fort Sill is located.

Summary of Employment Patterns by State Economic Area

In this section employment patterns in each of the state economic areas* are summarized. A list of the counties contained in each State Economic Area is presented in Appendix B. The same information is presented for ready reference in Figure 18.

From an examination of Table 50 it is obvious that agricultural employment decreased in each of the areas during the 1950-1960 period. Therefore, this point will not be repeated in each of the following sections.

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* For a definition of Census Economic Areas, see p. 46.

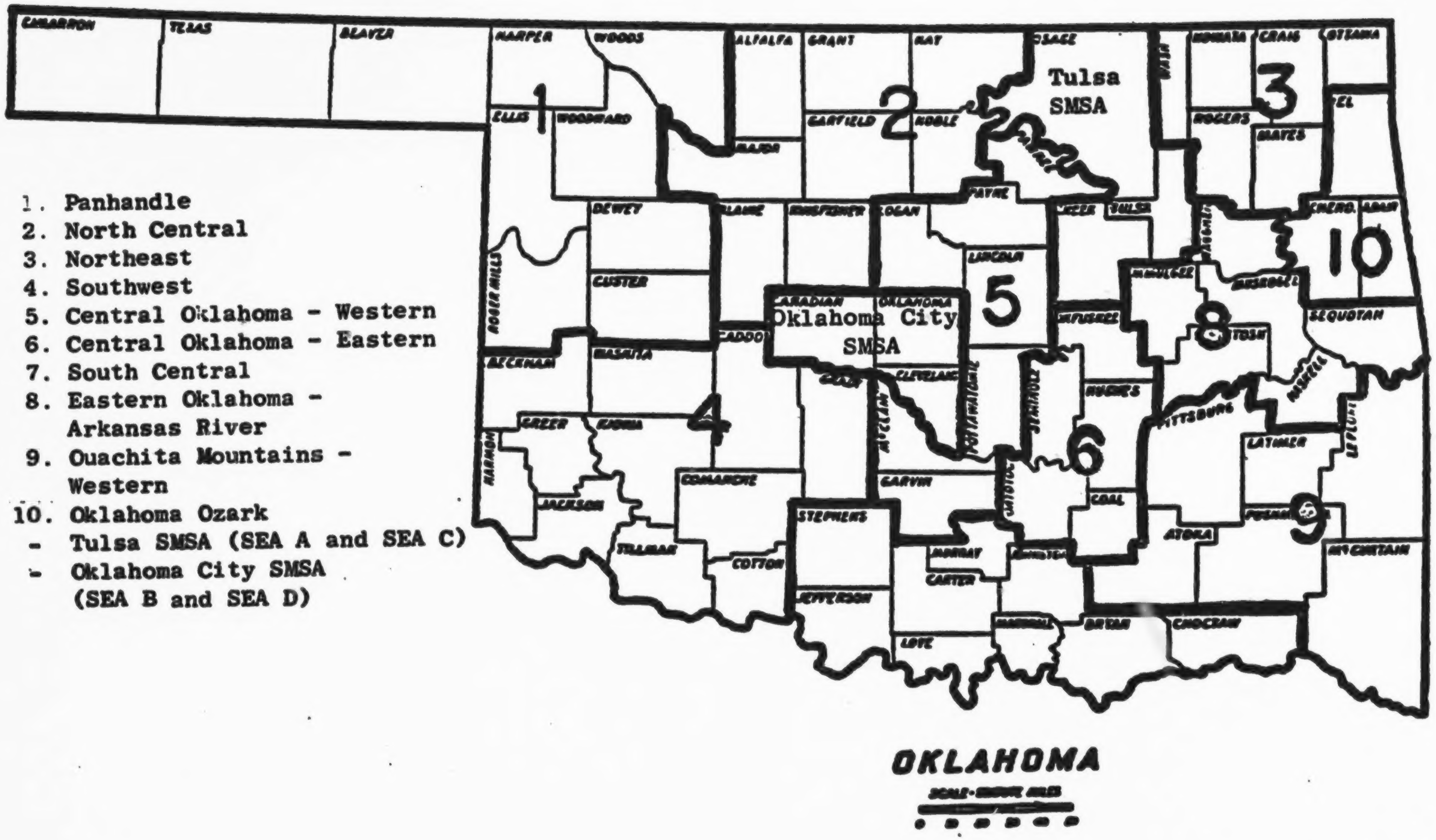
1. Panhandle
2. North Central
3. Northeast
4. Southwest
5. Central Oklahoma - Western
6. Central Oklahoma - Eastern
7. South Central
8. Eastern Oklahoma - Arkansas River
9. Ouachita Mountains - Western
10. Oklahoma Ozark
- Tulsa SMSA (SEA A and SEA C)
- Oklahoma City SMSA (SEA B and SEA D)
1
2
3
4
5
6
8
9
10
Tulsa SMSA
Oklahoma City SMSA
CIMARRON
TEXAS
BEAVER
HARPER
WOODS
ALFALFA
GRANT
KAY
OSAGE
NOWATA
CRAIG
OTTAWA
ELLIS
WOODWARD
MAJOR
GARFIELD
NOBLE
PAWNEE
ROGERS
MAYES
DEWEY
BLAINE
KINGFISHER
LOGAN
PAYNE
CREEK
TULSA
CHEROKEE
ADAIR
CUSTER
ROGER MILLS
LINCOLN
CANADIAN
OKLAHOMA
OKMULGEE
MUSKOGEE
SEQUOYAH
CADDO
WASHITA
BECKHAM
GRADY
CLEVELAND
McCLAIN
POTTAWATOMIE
SEMINOLE
HUGHES
McINTOSH
HASKELL
PITTSBURG
LATIMER
LE FLORE
GREER
KIOWA
HARMON
JACKSON
COMANCHE
GARVIN
PONTOTOC
COAL
TILLMAN
COTTON
STEPHENS
MURRAY
CARTER
JOHNSTON
ATOKA
PUSHMATAHA
McCURTAIN
JEFFERSON
LOVE
MARSHALL
BRYAN
CHOCTAW
OKLAHOMA

Figure 18. State Economic Areas Including Tulsa and Oklahoma City Standard Metropolitan Statistical Areas

Panhandle (SEA 1).--Three industries accounted for approximately 70 per cent of the total employment in the Panhandle area in 1960. There were 9,895 employed in agriculture, 7,250 employed in wholesale and retail trade, and 7,834 employed in the service industry.

The largest increases in employment from 1950 to 1960 occurred in mining, services, and wholesale and retail trade. The bulk of the increase in service employment (1,003) came about in Custer, Texas, and Woodward counties. Practically all (916) of the increase in service employment in these three counties occurred in the "medical and other professional services" category.

North Central (SEA 2).--Approximately three-fourths of the total 1960 employment in the North Central area was divided fairly evenly among four industries. There were 10,036 employed in agriculture, 9,519 employed in manufacturing, 11,783 employed in wholesale and retail trade, and 12,063 employed in the service industry.

Two industries had sizeable increases in employment during the 1950-1960 period. Manufacturing employment increased by 1,604 and service employment increased by 1,438. Over one-half of the increase in manufacturing employment (862) occurred in Kay County. Most of the increase in service employment (1,387) came about in Kay and Garfield counties. Expansion in the "medical and other professional services" category accounted for most of this gain.

Northeast (SEA 3).--Five industries accounted for 76 per cent of the total employment in the Northeast area in 1960. There were 4,189 employed in agriculture, 4,970 employed in mining, 7,625 employed in manufacturing, 9,164 employed in the service industry, and 8,340 employed in wholesale and retail trade.

Although there was a relatively large decline in agricultural and mining employment between 1950 and 1960, total employment increased. The contraction in agricultural and mining employment was offset primarily by increases in employment in manufacturing, wholesale and retail trade, and services. The bulk of the increase in manufacturing employment took place in Mayes (814), Ottawa (557), and Washington (990) counties. In Mayes County, the largest identifiable expansion in manufacturing employment (299) was in the "chemical and allied products" category. Washington County experienced an increase of 268 in the "electrical, and other machinery manufacturing" category. Most of the increase in service employment occurred in the "medical, and other professional services" category.

Southwest (SEA 4).--Three quarters of the total employment in the Southwest area was concentrated in four industries in 1960. There were 14,783 employed in agriculture, 16,179 employed in wholesale and retail trade, 16,080 employed in the service industry, and 28,584 employed in industries grouped under the "other" category. The "other" category includes armed services employment. Fort Sill, located in Comanche County, accounts for the relatively large employment figure in this category.

Agriculture and mining employment declined by 12,555 from 1950 to 1960. However, this decrease in employment was more than offset by increases in other industries, primarily government and armed forces, so that total employment expanded by 14,746.

Manufacturing employment increased by 1,038 during the decade of the fifties. Most of this expansion took place in Comanche (537) and Grady (309) counties. In turn, the expansion in manufacturing employment in these counties came about in "food and kindred products" category.

Employment increased in the service industry by 2,562. Most of this expansion (1,696) was realized in Comanche County. The "medical and other professional services" category accounted for most of the increase in service employment.

Central Oklahoma-Western (SEA 5).--Two industries accounted for approximately 44 per cent of 1960 total employment in this area. There were 11,218 employed in wholesale and retail trade and 14,565 employed in the service industry. About 40 per cent of total employment was fairly evenly distributed between five other industries. There were 6,613 employed in agriculture, 4,266 employed in mining, 4,465 employed in construction, 5,035 employed in manufacturing, and 4,193 employed in government.

The largest increases in employment from 1950 to 1960 occurred in manufacturing and government. Over 50 per cent of this increase came about in Pottawatomie County, where manufacturing employment expanded by 697 and government employment increased by 656. Most of the increase in manufacturing employment (553) in Pottawatomie County occured in the "electrical, and other machinery manufacturing" category.

Central Oklahoma-Eastern (SEA 6).--Almost 55 per cent of total employment in this area was concentrated in three industries. There were 3,098 employed in agriculture, 5,746 employed in wholesale and retail trade, and 5,836 employed in the service industry.

Manufacturing is the only industry class with any appreciable increase in employment during the 1950-1960 period. However the absolute gain in manufacturing employment was very small.

South Central(SEA 7).--Four industries accounted for approximately 68 per cent of total employment in the South Central area. There were

6,349 employed in agriculture, 5,933 employed in manufacturing, 10,670 employed in wholesale and retail trade, and 11,115 employed in the service industry.

The most sizeable increases in employment between 1950 and 1960 occurred in manufacturing and services. Most of the increase in manufacturing employment (2,088) was realized in Stephens County. In turn, most of this increase came about in the "electrical, and other machinery manufacturing" category. The bulk of the increase in service employment occurred in Carter, Bryan, and Stephens counties. In turn, virtually all of this expansion in employment came about in the "medical and other professional services" category.

Eastern Oklahoma-Arkansas River (SEA 8).--Almost 72 per cent of the total 1960 employment in this area was concentrated in four industries. There were 4,869 employed in agriculture, 7,767 employed in manufacturing, 9,105 employed in wholesale and retail trade, and 10,374 employed in the service industry.

The most sizeable increase in employment in the decade of the fifties occurred in the manufacturing category. All counties except Okmulgee County experienced some growth in manufacturing employment. However, three counties (Sequoyah, Muskogee, Wagoner) accounted for most of the expansion in employment in this category. Manufacturing employment increased by 419 in Sequoyah County, with most of this expansion (290) occurring in the "lumber, wood products, furniture manufacturing" category. Most of the expansion in manufacturing employment in Wagoner and Muskogee counties came about in the "other, and miscellaneous manufacturing" category.

Ouachita Mountains-Western (SEA 9).--Four industries accounted for approximately 73 per cent of total 1960 employment in this area. There were 4,576 employed in agriculture, 4,878 employed in manufacturing, 6,164 employed in wholesale and retail trade, and 6,711 employed in the service industry.

There were no sizeable gains in employment in any category in this area during the 1950-1960 period.

Oklahoma Ozark (SEA 10).--About three-fourths of total employment in 1960 in this area was concentrated in four industries. There were 2,113 employed in agriculture, 1,256 employed in construction, 2,018 employed in wholesale and retail trade, and 2,579 employed in the service industry.

Although employment increased in all categories save agriculture and mining during the 1950-1960 period, there was no sizeable expansion in any one category.

Tulsa SMSA.--Four industries accounted for approximately 70 per cent of the total employment in the Tulsa Standard Metropolitan Statistical Area. There were 31,431 employed in manufacturing, 33,385 employed in wholesale and retail trade, 33,284 employed in the service industry, and 10,333 employed in transportation.

Total employment increased by 32,086 in this area during the 1950-1960 period. Most of this increase occurred in Tulsa County where total employment rose from 99,664 in 1950 to 132,252 in 1960. Creek County experienced a decrease in employment from 13,477 in 1950 to 12,930 in 1960.

Manufacturing employment in Tulsa County increased by 8,998 during the decade of the fifties. This increase accounted for most of the growth in manufacturing employment in the area. The largest identifiable increase in manufacturing employment (2,260) in Tulsa County came about in the "electrical, and other machinery manufacturing" category.

Most of the expansion in employment in the services industry (8,208) came about in Tulsa County. A large amount of this increase (7,582) occurred in the "medical and other professional services" category.

Oklahoma City SMSA.--About 70 per cent of total 1960 employment in this area was concentrated in four industries. There were 22,519 employed in manufacturing, 43,306 employed in services, and 26,614 employed in government.

Total employment rose by 44,778 in this area during the 1950-1960 period. Most of this expansion occurred in Oklahoma County, where total employment increased from 133,952 in 1950 to 175,239 in 1960. During this same period employment in Canadian County decreased by 677. Approximately 50 per cent of the expansion in employment in Oklahoma County came about in three industries: government (7,684); manufacturing (6,179); wholesale and retail trade (5,903). Approximately 50 per cent of the increase in manufacturing employment (3,071) in Oklahoma County occurred in the "electrical, and other machinery manufacturing" category.

Practically all of the expansion in service employment (9,116) occurred in Oklahoma County. In turn, virtually all of this expansion (9,024) came about in the "medical, and other professional services" category.

CHAPTER VIII

TECHNICIAN EMPLOYMENT PRACTICES

A recent study entitled "Employment Practices of Technical Personnel in Oklahoma"[65] clearly indicates that far more demand exists for two year post-high school Oklahoma technical graduates by Oklahoma employers than is presently being supplied. On the other hand, over one-half (56.8 per cent)[66] of the 1967 technician graduates who took employment after graduation found their employment out of state. These two findings appear contradictory, but the following discussion will provide some explanation.

Information about employment practices of Oklahoma industry with respect to technical personnel was virtually nonexistent four months ago. The first study report, released in September 1967, included a recommendation that an in-depth study of employment practices and trends was essential before a realistic and efficient plan for manpower development could be realized. The report raised the following general questions concerning the employment of technical personnel by Oklahoma employers:

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[65] "Employment Practices of Technical Personnel in Oklahoma" conducted by Maurice W. Roney, Paul V. Braden, and Cecil W. Dugger. Also preliminary findings (in part) of Cecil W. Dugger in doctoral dissertation entitled "An Analysis of School-Industry Practices in the Placement and Employment of Post-High School Technician Graduates."

[66] Wilfred Bates, preliminary findings from "An Examination of the Relationship of Selected Variables to Interstate Geographic Mobility of Technician Graduates of the Associate Degree Programs in Oklahoma," (Oklahoma State University, unpublished doctoral dissertation, 1967).

> Is this /outmigration of technical manpower/ due to unusual job characteristics in Oklahoma industries? Are there salary differentials? Are Oklahoma firms recruiting and employing technicians from other states? Are their educational and experience requirements for technical jobs realistic? What are their relationships with Oklahoma technical schools? What are their quantitative and qualitative needs for new employees in the future? What kinds of in-plant and in-service training programs are needed for technical employees?[67]

Study Procedures

The "Employment Practices of Technical Personnel in Oklahoma" study was somewhat unique in methodology.[68] The approach was very direct in that Oklahoma employers were asked to provide specific statistical and policy information relating to the "two year post-high school technicians," not just "technicians." The second unique feature was the procedure used to obtain this information from Oklahoma employers. Group conferences were held in which employers were given detailed explanations of technical education. The scope and level of a two year post-high school technology curriculum was illustrated to make certain that the technical level of the occupations under study was well identified.

The "Employment Practices of Technical Personnel in Oklahoma" study was launched at an October 5, 1967, meeting of Oklahoma employers at Oklahoma State University. The employer representatives were completely briefed on the following related subjects:

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[67] Maurice W. Roney and Paul V. Braden, Occupational Education Beyond the High School in Oklahoma, The Research Foundation, Oklahoma State University, Stillwater, Oklahoma and The Center for Economic Development--State of Oklahoma, Norman, Oklahoma, September 7, 1967, pp. 162-163.

[68] For a complete report of methodology, see Appendix D. For a list of conference participants, see Appendix E.

1. The purpose and scope of the first report on Occupational Education Beyond the High School, released in September 1967
2. Information needed for the present report
3. Industry's role in technical education planning
4. Details of a system for collecting information in technical personnel needs in Oklahoma.

The employers who attended the October 5 conference served as the steering committee. They recommended that the system for collecting the data on employment practices include a complete briefing of employers by the study staff. A conference procedure was suggested utilizing information sheets which were to be returned later to the study staff.

Acting on the recommendations of the steering committee, a series of conferences were held in November 1967 at Oklahoma State University and December 12 and 13 at Oklahoma City and Tulsa, respectively. The Oklahoma City and Tulsa Chambers of Commerce were especially helpful in planning the conferences, selecting the participants, and providing facilities for the two conferences held in their offices. Ninety-nine employers participated in the seven conferences with 77 organizations represented. Of the 77 organizations, information was returned and analyzed from 50, or 64.9 per cent.

The 50 Oklahoma organizations returning information forms represent approximately 16 per cent of the Oklahoma nonfarm employment and approximately 60 per cent of the employed engineers and physical scientists in Oklahoma. Since engineering technicians work in direct support of engineers and physical scientists, it seems reasonable to assume that approximately 60 per cent of the abovementioned technician demand is included in the study. The Oklahoma employers, categorized by major activity, represented the following: 26 manufacturing, 4 public utilities, 1 service, and 9 government.

The categories of wholesale and retail trade, finance-insurance, and real estate were not included in the study since there is a relatively low concentration of engineering and physical science technicians in these activities. The mining category consisted exclusively of petroleum and natural gas industries and was classified with petroleum for purposes of this report. Construction firms were not represented at the conference.

Outstanding cooperation was obtained from the Oklahoma employers of technical personnel. Not all participants were able to return their information sheets in time to be included in this report, but consistent evidence of particular employer practices has emerged from the studies to date.

Analysis of Data and Findings

The analysis of data was made by breaking it down by relative emphasis, namely by: major activity and active or not active recruitment policy as to the employment of technical personnel. The flow of the technician demand analysis begins with the estimated present demand for technicians (both active and new programs) and continues with current and then future employment practices.

The Demand for Technicians

The 50 organizations for which data were obtained are analyzed by major activity and demand for two year post-high school technicians in Table 56. The largest activity category was manufacturing and the smallest was service. The manufacturing category also shows the largest demand for technicians. For the period 1968-1972, representatives from manufacturing estimated a need for 1,549 technicians or 38.2 per cent of the total estimated demand.

TABLE 56

PROJECTED TWO YEAR POST-HIGH SCHOOL TECHNICIAN DEMAND BY THE FIFTY OKLAHOMA ORGANIZATIONS FROM 1968 THROUGH 1972

Major Activity	Number of Firms	Total Number of Employers	Demand for Technicians (1968-1972)	Per Cent of Total Technician Need
Manufacturing	26	27,275	1,549	38.20
Public Utilities	4	17,048	83	2.05
Service	1	58	334	8.24
Government	9	35,548	1,451	35.78
Petroleum (Includes organizations in mining and/or manufacturing.)	10	16,775	638	15.73
TOTALS	50	96,704	4,055	100.0

The 50 Oklahoma employers indicated a demand for two year post-high school technicians which greatly exceeded the supply even if all graduate technicians took employment and remained in Oklahoma. Table 57 shows the demand for these technicians by program area and year. The total estimated demand for technicians was 1,117 in 1968 and 798 in 1972. The overall demand for the combined years of 1968-1972 was 4,055. The largest demand for any one single year was indicated for 1968. This fact might be related to the rather sudden exposure of Oklahoma employers at the industrial conferences to certain additional information, e.g., location of training institutions, types of graduates available, and the potential productivity of the technician with a minimum of on-the-job training.

The largest estimated demand for the years 1968-1972 was for electronics technicians. There was a demand for 943 electronics graduates, followed by 911 drafting and design, and 651 mechanical. It should be noted again that this information pertains to only 50 Oklahoma firms and therefore represents only 60 per cent of the total demand for technicians.

The overall demand for 404 technicians listed as "other programs" in Table 57 represents one of the single most important communications the study staff received from Oklahoma employers. The demand by program and year for the graduates of "new programs" is presented in Table 58. The largest demand in the area of "new programs" was for 150 pipeline, automation, and instrumentation technicians followed by 80 electrical and 76 gyroscopics technicians.

The 1967 graduates of existing technical programs provide the best estimate at this time for the number of graduates expected in 1968. The minimum additional requirements for technical personnel in Oklahoma in the spring of 1968 can be roughly estimated by contrasting 1968 technician demand with the 1967 graduates as shown in Table 59. The largest "gap" is in the mechanical technology field followed by electronics and drafting and design. The minimum additional estimated need is for 627 technical graduates in existing program areas.

TABLE 57

ESTIMATED DEMAND OF 50 OKLAHOMA EMPLOYERS FOR TWO YEAR POST-HIGH SCHOOL TECHNICIAN GRADUATES FOR THE YEARS 1968-1972, BY PROGRAM TYPE

Technical Programs	1968	1969	1970	1971	1972	Total
Aeronautical	32	32	33	33	33	163
Chemical	29	32	0	34	34	129
Civil	7	6	10	10	12	45
Civil & Highway	22	26	25	28	25	126
Construction	1	2	0	0	0	3
Data Processing	40	35	31	41	35	182
Drafting & Design	168	171	182	191	199	911
Electronics	230	173	177	176	187	943
Fire Protection	35	31	31	41	51	189
Instrumentation and Process Control	30	0	24	21	20	95
Mechanical	367	58	70	76	80	651
Metals	14	13	15	13	14	69
Petroleum	13	17	17	18	18	83
Radiation	0	1	0	0	1	2
Refrigeration and Heating	11	13	13	12	11	60
Other Programs	118	68	66	74	78	404
TOTALS	1,117	678	694	768	798	4,055

TABLE 58

ESTIMATED DEMAND FOR GRADUATES OF RECOMMENDED NEW TECHNICAL PROGRAMS BY 50 OKLAHOMA EMPLOYERS

Recommended Technical Program	1968	1969	1970	1971	1972	Total
Electrical	11	11	19	19	20	80
Quality Control	1	3	0	1	2	7
Electro-mechanical	2	2	3	2	2	11
Manufacturing	14	14	12	13	14	67
Paper Manufacturing	2	2	2	2	2	10
Pipeline Automation and Instrumentation	28	29	30	31	32	150
Gyroscopics	60	6	0	5	5	76
Metals Research	0	1	0	1	1	3
TOTALS	118	68	66	74	78	404

Note: An additional demand for personnel was indicated for the 1968-1972 years in the important program areas of sanitary service 6, machinists 150, auto body 35, and accounting 5.

TABLE 59

A COMPARISON OF THE NUMBER OF 1967 GRADUATES OF EXISTING TECHNICAL PROGRAMS TO THE 1968 ESTIMATED NEED BY FIFTY EMPLOYERS FOR TWO YEAR POST-HIGH SCHOOL TECHNICIAN GRADUATES

Existing Technical Program	1967 Technician Graduates	1968 Projected Demand	Minimum Additional Technicians Required
Aeronautical	9	32	23
Chemical	10	29	19
Civil	0	7	7
Civil & Highway	4	22	18
Construction*	2	1	--
Data Processing	37	40	3
Drafting & Design	135	168	33
Electronics	120	230	110
Fire Protection	9	35	26
Instrumentation and Process Control	3	30	27
Mechanical	29	367	338
Metals	4	14	10
Petroleum**	0	13	13
Radiation*	11	0	--
Refrigeration and Heating***	57	11	--
TOTALS	430	999	627

* The construction industry was not represented among the 50 employers.

** The Petroleum program began in 1965 and will have graduates in Spring, 1968.

*** Only 1 service organization was represented.

Current Employment Practices

The preceding section clearly established that there is a demand for two year post-high school technicians by Oklahoma employers which far exceeds the current supply by Oklahoma institutions offering technical programs. Do Oklahoma employers have employment policies and practices which would enhance the chances of satisfying this demand? Some insight into this question is found in an analysis of the following responses.

Oklahoma employers of technical personnel were asked "What geographic location is your primary source of technicians?" Of the 47 Oklahoma employers who responded to this question, 44, or 93.6 per cent, indicated their primary geographic source of technicians was Oklahoma. It would seem to follow that Oklahoma employers should actively recruit Oklahoma technician graduates. Oklahoma employers were asked "Do you actively recruit graduates of two year specialized post-high school technical programs?" Only 20 of 49 respondents, or 40.8 per cent, answered yes. However, when asked if they had positions for which two year post-high school graduates were preferred, 33, or 67.4 per cent, answered yes.

The indication that most Oklahoma employers are not yet actively recruiting recent two year post-high school technician graduates is supported by responses to the question, "Do you primarily fill semi-professional technical positions with recent graduates of two year post-high school technical programs or with experienced technicians?" Of the 46 responses to this question, 36, or 78.2 per cent, indicated that they desired experienced technicians.

The parodox of the technical graduate employment situation in Oklahoma begins to clear when the above information is reviewed in total. The majority of Oklahoma employers (33 of 49) have positions for which preference is given to two year graduates. Also 36 of the 49 Oklahoma employers want experienced technicians. When we add to the above that almost all Oklahoma employers (44 of 47) look to Oklahoma as their source of technicians the following incongrous pattern develops: Since Oklahoma employers want experienced two year post-high school technicians, the technician graduate might well be forced to leave the state for employment in order to gain experience. Since graduate technicians seem to prefer Oklahoma over other states when job opportunities are somewhat equal (see Chapter VI, page 106) some might return to Oklahoma.

The 33 employers out of 49 who said they had positions for which two year post-high school technicians were preferred were asked to rank the most important reasons for giving employment preference to two year post-high school graduate technicians. The most frequently identified reason was "He is productive with a minimum of training," followed by "Has broad technical background which permits flexibility in job assignment." The third most important reason was "Has potential to move up to positions of increased responsibility." Of the 16 employers who indicated they do not have positions for which two year post-high school technicians are given employment preference, the most frequently indicated reason was "Organizational policy is to upgrade present employees rather than to employ new technical personnel." Other reasons given for not giving preference to two year post-high school technician graduates were: "Organization policy gives preference to B.S. degree holders," "We are unfamiliar with the ability level and potential of technical school graduates," and "A union bargaining unit covers technician jobs."

Of the 20 employers who actively recruited technicians, 17, or 85 per cent, had positions for which they gave preference to two year graduate technicians. The most frequently indicated reason for giving preference (13 of the 17) was "He is productive with a minimum of on-the-job training." The reason given by employers who did not have an active recruitment policy but who gave preference to two year post-high school graduates, was "Has broad technical background which permits flexibility in job assignment." This response was given by 8 out of 16 employers. This might indicate that those who do have an active recruitment policy have had enough experience with graduate technicians to know that they are productive with a minimum amount of experience. This seems verified by the number of organizations that do not have active recruitment policies who prefer experienced technicians. Of the 29 organizations who do not have active recruitment policies, 24, or 85.71 per cent, prefer experienced technicians as opposed to 9 of the 20, or 47.37 per cent, who do have active recruitment policies.

The communications network between Oklahoma employers and institutions providing technician graduates is presented in Table 60. The largest number of contacts exist at Oklahoma State Tech at Okmulgee, followed by Oklahoma State University Technical Institute, Stillwater; Oklahoma State University Technical Institute, Oklahoma City; Langston University; and Northeastern A & M College at Miami.

TABLE 60

A FREQUENCY ANALYSIS OF THE COMMUNICATIONS NETWORK OF 50 OKLAHOMA ORGANIZATIONS THAT EMPLOY TECHNICIAN GRADUATES WITH THE INSTITUTIONS WHICH SUPPLY TECHNICIAN GRADUATES

INSTITUTIONS / QUESTIONS	Received information about their technical programs	Received information about their graduating technicians	Conducted tours for technical students	Sent literature explaining benefits of working with your organization	Extended invitations to technical students to visit your organization	Sent a list of job openings	Placed technical students in part-time work during school year or summer	Sent a representative to interview and recruit graduating technicians	Made job offers to graduating technicians	Hired technical graduates
Altus Junior College Altus	1									
Cameron State College Lawton	1						1			
Connors State College Warner							1			1
Eastern Okla.A&M Col. Wilburton	1								1	1
Langston University Langston	7	1	2	6	4	3	3	5	5	4
Murray State College Tishomingo										
Northern Okla. College Tonkawa	5	1	2	4	2	0	1	1	2	3
Northeastern Okla.A&M Miami	5	2	1	3	0	1	3	1	3	4
Oklahoma State Tech Okmulgee	30	16	10	11	12	10	5	13	20	16
OSU Technical Institute Stillwater	22	7	4	7	5	4	6	7	9	12
OSU Technical Institute Okla. City Branch	18	3	3	4	2	4	2	5	5	6
Sayre Junior College Sayre	2	0	0	2	1	0	1	0	1	0

Future Employment Practices

Perhaps the most important information gained from the study of "Employment Practices of Technical Personnel in Oklahoma" was the future employment practices indicated by Oklahoma employers. The employers were asked "During the next 5 years, do you anticipate an increase in the employment of two year post-high school technical graduates?" Of the 49 employers who responded, 44, or 89.8 per cent, gave a positive response. Five employers indicated "no change" and no employers indicated a decrease. The most frequently indicated reasons given for the increase in the employment of two year post-high school technical graduates are shown in Table 61.

TABLE 61

A FREQUENCY COUNT OF THE REASONS WHY 44 OF 49 OKLAHOMA EMPLOYERS PROJECTED AN INCREASE IN THEIR EMPLOYMENT OF TWO YEAR POST-HIGH SCHOOL TECHNICAL GRADUATES

Reasons Given for Increase	Frequency Of Response
Growth of the organization's present activities	36
Restructuring of tasks which were formerly assigned to engineers	26
Work becomming more technical	21
Organization engaging in new activities	14
To fill vacancies	3
Addition of new departments	2

In conclusion: Oklahoma employers of technical personnel plan to increase their efforts in relation to employing two year post-high school technical graduates primarily because of the growth of the organization's present activities. The employers plan to look for these technicians in Oklahoma. The estimated need of Oklahoma employers for two year post-high school graduates far exceeds the present supply from Oklahoma institutions with technical programs. A coordinated expansion of technician programs is indicated in order to meet the estimated need.

The great majority of Oklahoma employers have technical positions for which they will give preference to graduates of two year post-high school technician programs. The employers who do not have such positions say they have "Policies which promote employees to technician level jobs through upgrading of present personnel" or they were "Formerly unfamiliar with the ability level and potential of these graduates." Less than half of the Oklahoma employers state that they are actively recruiting technician graduates at the present time. Furthermore, many Oklahoma employers seem to show a definite desire for experienced technicians. The desire for experienced technicians appears to be more dominant in organizations with low utilization of technicians and which do not have an active recruitment policy. Oklahoma employers who have an active recruitment policy are more likely to recognize that the recent technician graduates are productive with a minimum of on-the-job training.

There is a distinct possibility that the dialog between employers and technical education specialists in the seven conferences will result in an increased interest in graduates of Oklahoma technical schools. It was evident to the study staff that many employers in attendance were not fully aware of the graduate technicians' potential value in their organizations.

CHAPTER IX

WHO IS BEST SERVED BY OCCUPATIONAL EDUCATION BEYOND HIGH SCHOOL

Specialized occupational education beyond high school should serve those individuals who are not being served by other educational programs. In general, these individuals have not obtained education or training either in high school or college commensurate with their ability for one or more of a number of reasons: lack of interest; unavailability of vocational education programs; misdirection by parents, counselors, or others; or simply, lack of funds.

The group to be served includes many who, for economic and other reasons, will either not enroll in baccalaureate degree programs, or if they do enroll with this objective, will drop out before completing the program. It is well known that the latter group contains many able individuals. Records of the Oklahoma State University Technical Institute show that, over one three-year period, 50 per cent of the associate degree graduates (two year technology programs) had previous college work before enrolling in the Institute. The average amount of prior credit earned was 43 semester hours. The grade point average of this group was 2.7 in courses required for the associate degree, as compared with a 2.4 grade point average for all graduates of the Technical Institute for this same period.

Student Characteristics

Attempts have been made to describe the student who can profit most from a post-high school program such as the associate degree curriculums offered by technical institutes and some junior or community colleges. At a recent institute for technical education administrative personnel, a group of 40 administrators from 26 states described the typical successful student as:

> A capable individual with an average or better high school record; intensely interested in a specialized field of study; probably not interested in academic subjects; motivated largely by practical applications rather than by theoretical abstractions; willing to give extra effort in learning those things that are meaningful to him.[69]

Kenneth B. Hoyt, head of the division of counselor education at the University of Iowa in testimony before an Iowa legislative committee, gave the following description of what he terms "specialty oriented students":

> As Director of the Specialty Oriented Student Research Program for the past five years, I have collected and analyzed data for approximately 12,000 students attending trade, technical, and business schools operating at the post-high school level in various parts of the United States. In the course of this data collection, I have visited personally with hundreds of these students. While I do not want to present specific research findings here, I would like to share some generalizations with you growing out of what this research has taught me.
>
> First, I have become convinced that there are many people whose primary educational motivations are oriented around a desire to acquire specific job competencies which they can use to enter and succeed in the labor market. We have called such persons "specialty oriented students" as opposed to "liberal arts oriented" students who have additional kinds of educational motivations. I have observed hundreds of such students in trade, technical, and business schools who,

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[69] Report of 1966 Summer Institute for Technical School Administrators, School of Industrial Education, Oklahoma State University, Stillwater, Oklahoma.

> in spite of the fact they did not achieve well or work hard in high school, were working and studying very hard in the specialty training centers that concentrated their full attention on developing occupational skills. It has not seemed to me that the specialty institutions gave these students their motivation. Rather, the specific occupational training programs seemed to open up motivations which were already present in these students.
>
> Second, I have seen hundreds of these students who entered specialty schools after dropping out of a junior college or senior college setting. They have told me over and over again that they did so because they did not want to take the liberal arts courses such settings required of them. One of the questions we ask in our research program is "What is the biggest difference between this and other schools you have attended in the past?" Over half of these 12,000 students have answered this question by choosing a response which reads, "Here we study only what we need to know." It is very important to such students that they see a direct and meaningful connection between what they are asked to learn and their preparation for employment in the labor market. This seems to be the most important reason why they chose to attend a specialty institution rather than one which also offered them general academic information.
>
> Third, our data indicates that students are willing to travel considerable distances in order to secure specialty training. The typical student we studied in trade school settings traveled over 200 miles to attend school. Furthermore, the geographic radius from which students are drawn seems to correspond closely to the effective geographic radius in which students are placed after graduation. The wider the recruitment base, the wider the placement base seems to be a safe generalization based on our research data.[70]

There is no evidence to indicate that Hoyt's description of the "specialty oriented student" would not be applicable in Oklahoma. On the contrary, the description seems remarkably apt.

The Potential Population to be Served

If, indeed, this is the kind of student who can profit most from post-high school education of a specialized nature, a reasonable estimate can be made of the population which could be served. One method of making this estimate is to determine the number of high school graduates with average or better intelligence who do not complete college. Figure 19 uses as a base the standard curves obtained by the Army General Classification Tests.[71] For each curve of population reaching a given level there is a larger population possessing the same ability who are not educated to that level.

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[70] Kenneth B. Hoyt, "The Community College--Area Vocational School--Junior College Controversy in Iowa," a talk given recently before the Iowa Legislature.

Figure 19 applies these standard curves to the total age group containing the 1967 Oklahoma high school graduating class. The shaded area represents only those high school graduates who might expect to score between 108 (high school mean) and 120 (college graduate mean).

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[71] Dael Wolfle, America's Resources of Specialized Talent. (New York: Harper and Bros., 1954), pp. 142-146.

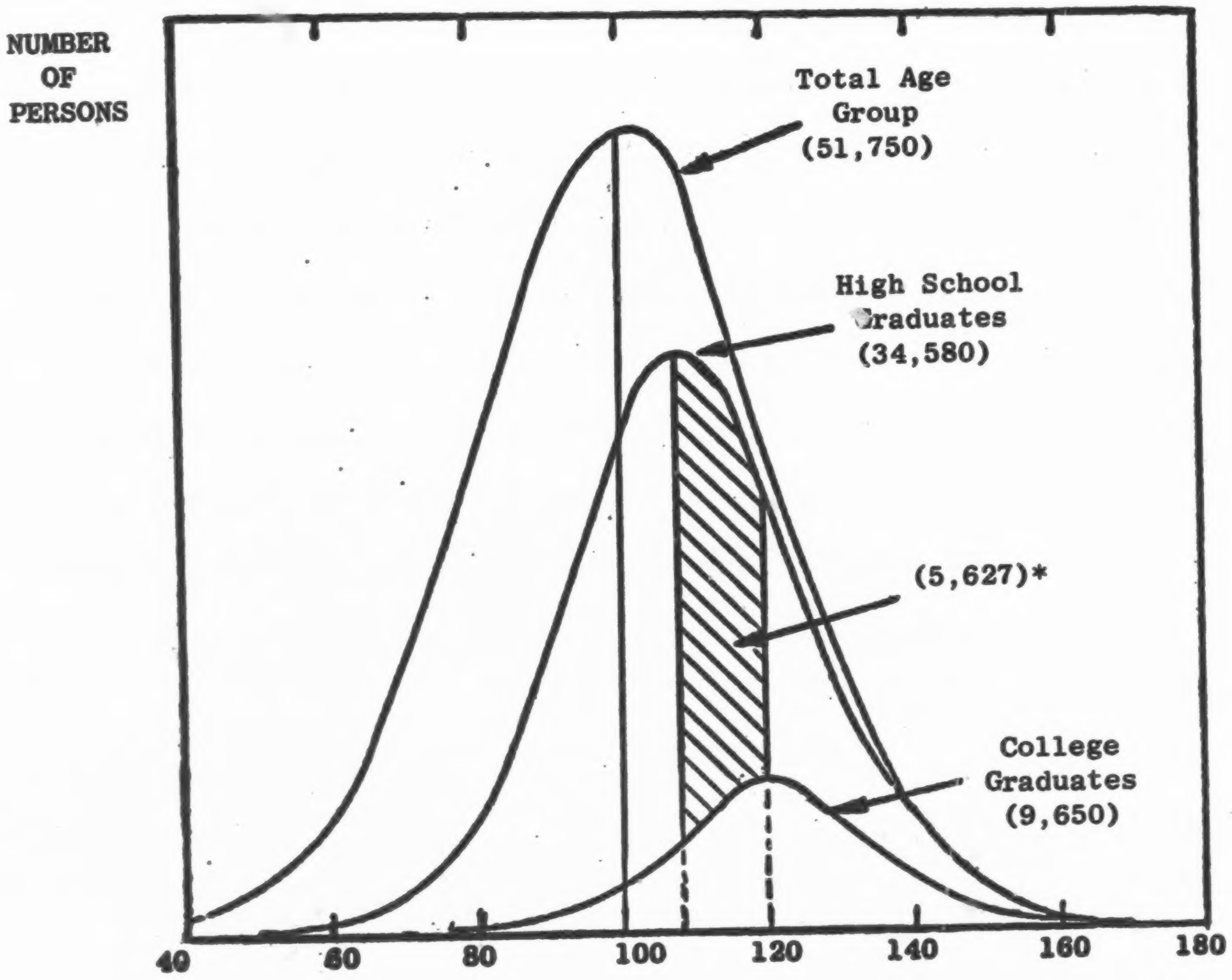

Figure 19. Assumed intelligence distribution of Oklahoma population in the high school age group based on standard AGC curves.

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* The shaded area represents those high school graduates with intellectual ability between roughly 108 (average of high school graduates) and 120 (average of college graduates) who might be considered as prime candidates for specialized occupational training.

Source: Basic graph a modification of Dael Wolfle's, America's Resources of Specialized Talent, (New York: Harper and Bros., 1954), pp. 142-146; and Joseph M. Pettit, "The Changing Status of Graduate Engineering Education," Journal of Engineering Education, (Washington: American Society for Engineering Education, January, 1967), p. 368.

By definition, within this group of approximately 5,630 young people would be found those who could profit most from post-high school education of a specialized occupational nature. Obviously there are many above and many below this particular ability grouping who could well be served. Also, there are many in each age group who do not graduate from high school but who do have the necessary ability to pursue occupational education programs at the post-high school level. If the total age group reaching age 18 in any year (51,750 in Oklahoma in 1967) is considered, and if those who enter and remain in college and those who will not enter the labor market are excluded, a conservative estimate of those who could profit from specialized education would be 10,000 persons from each year's graduating class.

Some insight into the ability level of Oklahoma entering technical students is gained from the preliminary findings of Donald S. Phillips[72] in his doctoral dissertation entitled "Personal and Social Background Characteristics of Entering Technician Education Students at the Four Post-High School Institutions." The 724 students included in this study were: (1) enrolled in a technical program for the first time during the 1967 fall semester, and (2) enrolled as full-time day students. The four Oklahoma institutions included in the study were: (1) a residential junior college, (2) a residential vocational-technical school, (3) a technical institute in a metropolitan area, and (4) a technical institute located on the campus of a state university.

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[72] Donald S. Phillips, preliminary findings from doctoral dissertation entitled "Personal and Social Background Characteristics of Entering Technical Education Students at Four Post-High School Institutions," (Stillwater, Oklahoma: Oklahoma State University).

Phillips found the ability level of entering technical students who were enrolling in the technical programs in the institutions studied to be quite high in spite of the fact that the majority of these students did not discuss their future schooling plans with high school counselors. The composite American College Test (ACT) scores of these entering technical students was found to be similar to the median ACT scores for all the Oklahoma state junior colleges and four year colleges as reported in a 1962 report of the State Regents for Higher Education.

The ability level of the entering technical students studied by Phillips also varies between the four institutions. In addition, the students were found to differ on measures of socioeconomic background factors and on a number of personal and social background characteristics.

The Status Problem

Whatever plan is adopted to strengthen Oklahoma's system of post-high school education, it must provide incentives that will make the occupational education programs attractive. The specific advantages of this kind of education must be made apparent and some of the apparent disadvantages must be eliminated. At present in Oklahoma the "thing to do" after high school is to go to college.

A statewide study conducted by the Research Coordinating Unit of the State Department of Vocational Education during the Spring of 1967 obtained information on the plans of 29,798 of the 34,500 Oklahoma seniors. A total of 23,832 (79.9 per cent) indicated that they plan to continue their education. Their selection of schools for this purpose is shown in Table 62.

TABLE 62

POST-HIGH SCHOOL EDUCATIONAL PLANS OF 29,798 OKLAHOMA HIGH SCHOOL SENIORS

Type of School	Number	Per Cent of Total
College or University	14,216	47.71
Junior College	2,862	9.60
Vocational or Technical School	2,920	9.80
Business School	1,417	4.76
No School Chosen	2,411	8.09
No School Plans	5,972	20.04
TOTALS	29,798	100.00

In order to make projections, it is assumed that the percentages shown in Table 62 will hold for the entire 1967 graduating class of 34,500 seniors. Further, it is assumed that the 8.11 per cent who indicated no choice of schools will eventually choose schools in the same proportion as those who indicated a choice. With these assumptions:

62.8 per cent, or 21,650, plan to enter university, college, or junior college.

17.2 per cent, or 5,950, plan to enter nonbaccalaureate degree institutions.

20 per cent, or 6,900 do not plan to go on to school.

If the current attrition rates in higher education hold for these students, 56 per cent of those who enter college will not complete the requirements for a degree. A similar attrition rate is found in occupational education programs. Using this rate of attrition for each group, the number of graduates would be approximately 9,600 college graduates and 2,600 graduates of occupational curriculums.

It is interesting to compare these estimates of education and training with the normal distribution of occupations in the work force which require those levels of education.

A research team from the University of California has identified three levels at which students leave the educational system and the areas in which they find employment.[73] The research team assumed a sample of 1,000 students at the seventh grade level and applied dropout and transfer rates from several research reports. The data indicated that students tend to leave school at three levels and take employment at corresponding levels. Table 63 compares the findings of the University of California study with data obtained by the Oklahoma State Regents for Higher Education.

While the data obtained by the Regents does not contain a detailed breakdown of the three subcategories under Level II, it is significant that only 4 per cent of the Oklahoma students leave school at this level as compared with the 16.3 per cent estimate of the University of California study group.

The National Association of Secondary School Principals, in an attempt to identify the number of high school students needing some kind of vocational education, suggest that the proportions of students who enter the labor market should be as follows:

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[73] A Hypothetical Framework for Vocational Education, unpublished report of part of a research project, University of California, Berkeley, for a Vocational-Technical Education Study of Alameda and Contra Costa Counties in California.

TABLE 63

A COMPARISON OF OKLAHOMA STUDENTS WITH A NORMATIVE SAMPLE DETERMINED BY A UNIVERSITY OF CALIFORNIA STUDY GROUP

Level I. Those with a minimum of vocational education:

Leave school as:	California Study	Oklahoma Regents Study
High school dropouts	290	265
High school graduates not continuing	206	275
Lower division dropouts from colleges and universities	114	167
Dropouts from junior colleges	76	53
Dropouts from special adult schools	17	--
	703	760

Enter jobs categorized as:

Unskilled or semiskilled work: machine and equipment operation, basic clerical and distributive jobs, skilled trades.

Level II. Those who have completed occupational programs at the junior college level, or have gained competency in collegiate upper division work:

Leave school as:	California Study	Oklahoma Regents Study
Graduates of special adult schools	26	--*
Graduates of junior colleges	75	--*
Upper division dropouts from colleges and universities	62	--*
	163	40

Enter jobs categorized as:

Semiprofessional, technical, licensed occupations, complex clerical, complex distributive.

Level III. Those who complete four or more years of college:

Leave school as (or with):	California Study	Oklahoma Regents Study
Graduates with AB or BS degrees	67	--*
Graduate study experience	67	--*
	134	200

Enter jobs categorized as:

Managerial or professional.

* Breakdown figures not available.

Level III:	College graduates and above	20 per cent
Level II:	Junior college and special school graduates	25 per cent
Level I:	High school dropouts, high school graduates, and junior college dropouts	40 per cent
	Those not entering the labor market or wanting vocational education	15 per cent
		100 per cent

Compared with this estimate, the 4 per cent of Oklahoma students at level two is even further out of line. The NASSP also identified and described four groups of high school students as follows:

1. The college-bound. In this group are two sub-groups: (1) those going into four-year and graduate programs for the professions and (2) those preparing for programs of two years or more for technically oriented occupations. Students were described as above average and bright, with financial resources and an interest in college. Those interviewed estimated that 40 to 60 per cent of high school students were in this group.

2. The vocational education group. These were described as the average-ability students who for reasons of achievement, interest, and finances are not going to college. They are also interested in preparing for work in high school. A few were regarded as college-bound students with a trade or other occupational skill as an avocational or temporary vocational interest (e.g., clerical skills to pay one's way through college). Also a few below-average, dependable "good kids" were included. The vocational education group is estimated to be about 30 to 40 per cent of the high school population.

3. The potential dropouts. These are the unresponsive and irresponsible, the disoriented, the low achiever, and the "goof off" and trouble-maker. In this group are 10 to 20 per cent of the school population.

4. The indeterminate group. This category was not always identified. Its members have a wide range of academic and financial ability. Some of them are in the college preparatory course. Most, however, are in the general education sections of high school classes. Their chief characteristic is that they have not chosen or felt the

> need of choosing their vocational and life goals. Approximately 10 to 20 per cent of the high school students can be classified this way.[74]

Some Misconceptions

One of the major causes of low enrollment in technical programs in the past has undoubtedly been a lack of understanding as to the opportunities for graduates. This lack of understanding is reflected by the attitude of parents, high school counselors, and teachers toward what many mistakenly consider to be a "terminal" program, one that does not lead directly to a baccalaureate degree. In Oklahoma, where more than 60 per cent of the high school graduates do, in fact, enter college, this attitude is understandable. Much more evidence is needed, however, before the true significance of this attitude can be measured. If, indeed, individuals are being advised not to enter associate degree programs for this reason, two facts should be made known to school personnel and the general public.

1. Baccalaureate degree programs, designed especially for associate degree graduates of technology programs, are now available in colleges and universities throughout the United States. In Oklahoma, graduates of two year specialized technical programs can complete the requirements for a B.S. degree in Technical Education at the Oklahoma State University with two additional years of study.

2. The baccalaureate degree is not required for success in many technician occupations. Many employers now prefer persons with two years of specialized technical training for technician occupations. A recent

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[74] Dale C. Draper, Educating for Work, National Committee on Secondary Education, Paper No. 2 (Washington: 1967), pp. 19-20.

study by the Engineering Manpower Commission[75] compared the salaries of technical school graduates working in technician jobs with nongraduates working the same jobs and with the lower quartile of engineers' salaries. This study, conducted in 1966, covered 451 organizations employing 55,737 technicians.

Probably the most significant finding of this survey is that graduates of technical institutes and similar schools appear to command noticeably higher salaries at all levels, when compared with technicians in general. There may be some question as to equivalency of experience in these two groups, but the differential in salary is unmistakeable. For the first 14 years or so, the difference averages about $1,000 per year in favor of the graduates. Beyond that point there appears to be a strong divergence in the salary patterns, presumably reflecting basic differences in employment functions. Median salaries of nongraduate technicians flatten out after 14 years and rise very gradually to a maximum of about $8,600 per year. Graduate technicians, on the other hand, continue to enjoy increasing higher salaries. Their median rises above $13,000 per year at 21-25 years of experience, then tapers off to the end of the chart. The shape of the curve for graduate technicians corresponds broadly with that for the lower half of all graduate engineers. This leads to the conclusion that the average technical school graduate is able to achieve the salary of a graduate engineer, despite presumptive differences in job functions. These curves are plotted on the same scale in the accompanying graph to show more clearly the points of similarity and difference (See Figures 20, 21, and 22).

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[75] Salaries of Engineering Technicians, Engineering Manpower Commission of Engineers Joint Council, (New York: The Council, 1966).

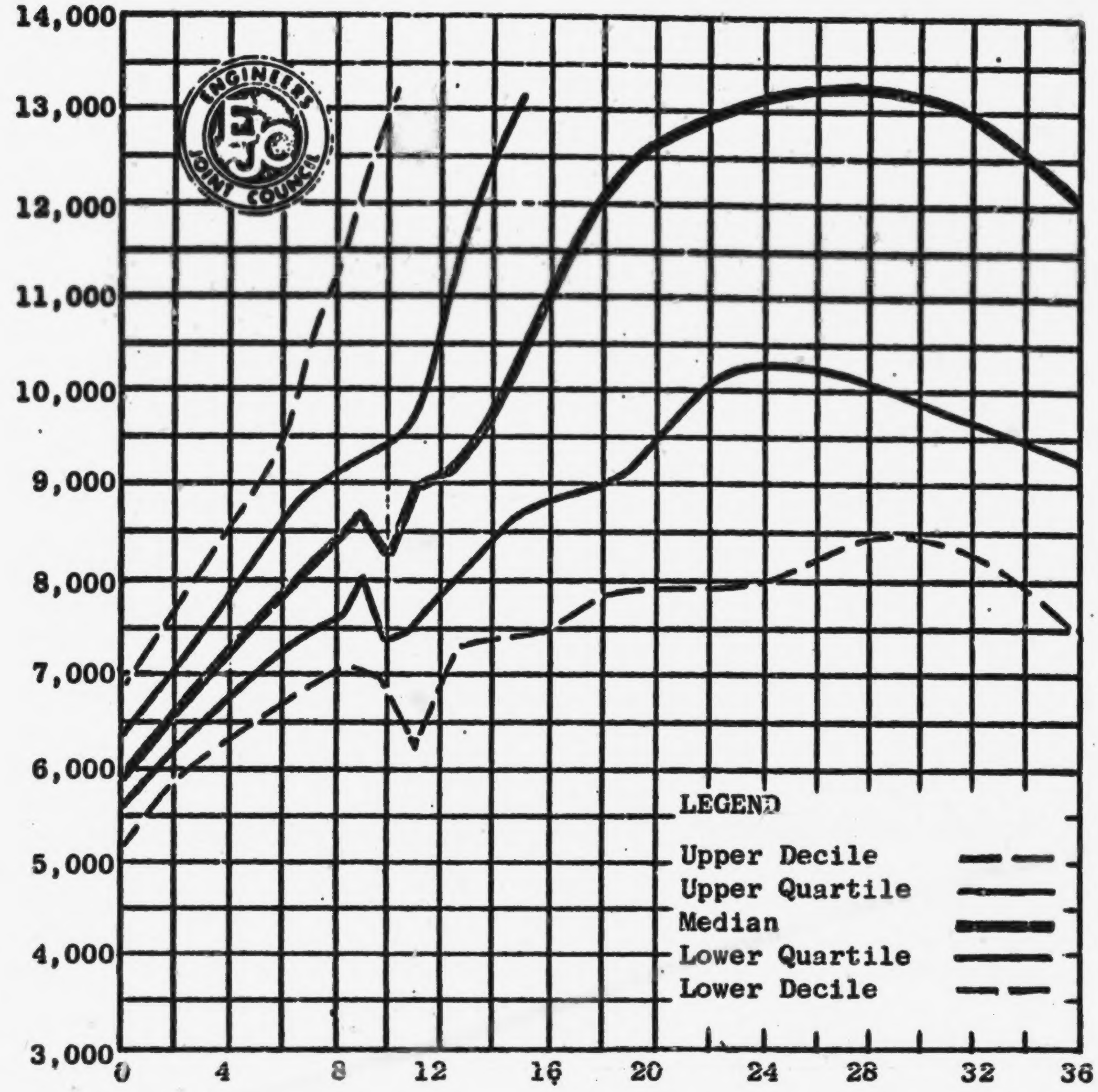

Figure 20. Annual salary of engineering technicians by years since graduation from technical institute, with base year (0 years since graduation) 1965, for all industry. Number of technicians covered is 4,424.

Source: Salaries of Engineering Technicians, Engineering Manpower Commission of Engineers Joint Council, (New York: The Council, 1966), p. 17.

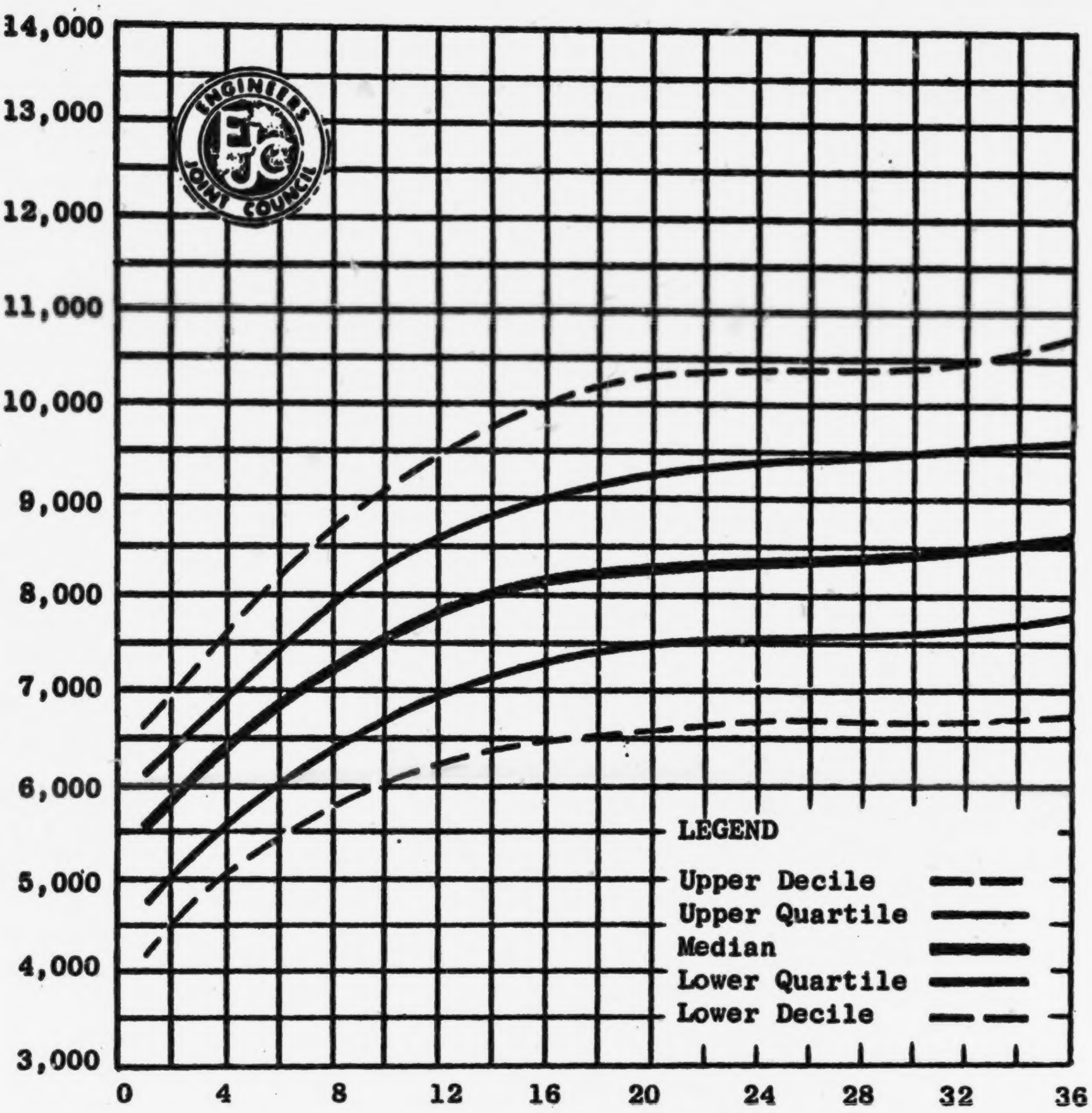

Figure 21. Annual salary of engineering technicians who did not graduate from technical institute, by equivalent years since graduation, with base year equivalent to age 21, and for all industry. Number of technicians covered is 30,139.

Source: Salaries of Engineering Technicians, Engineering Manpower Commission of Engineers Joint Council, (New York: The Council, 1966), p. 17.

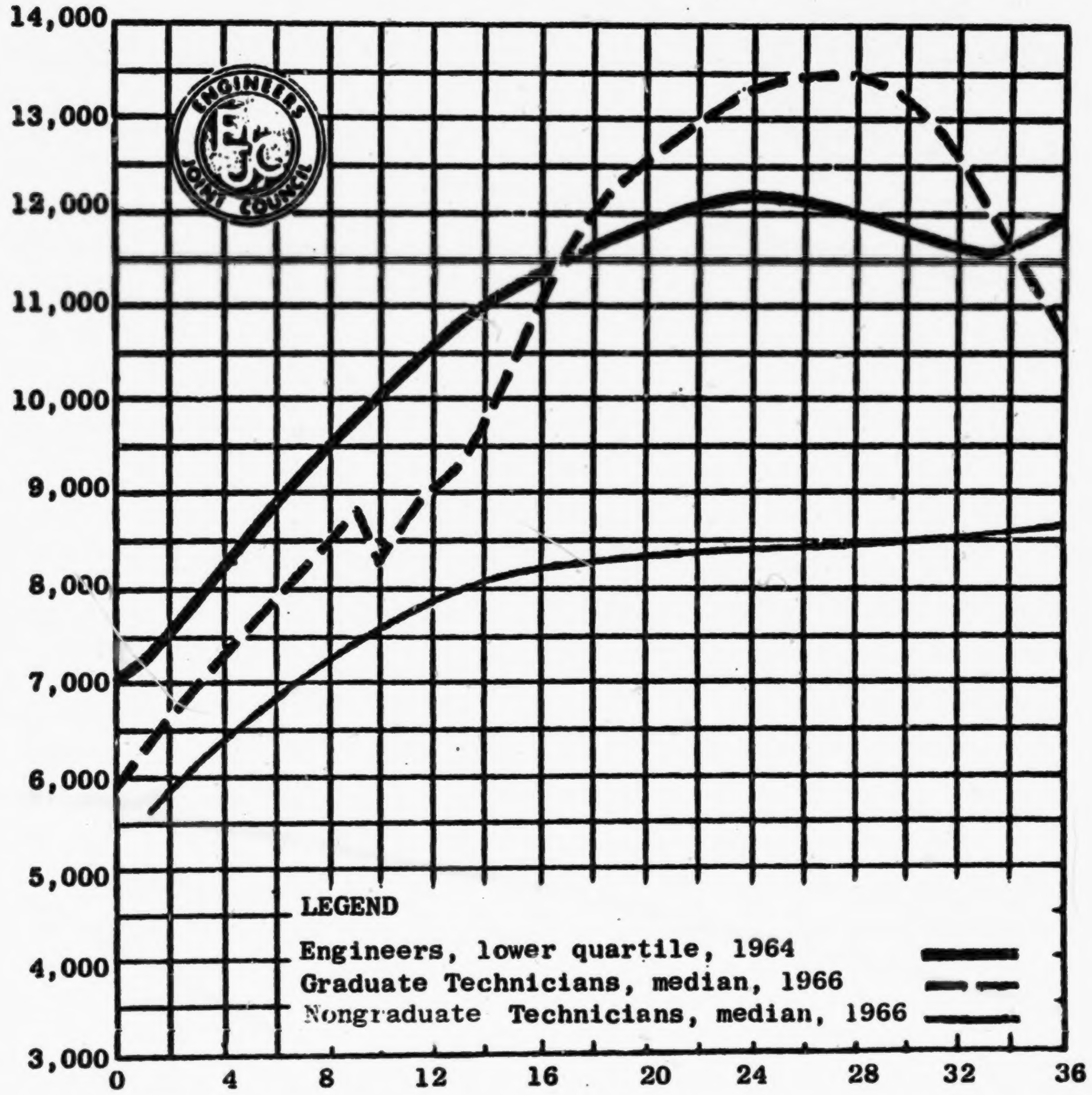

Figure 22. Comparison of annual salary of engineers, graduate technicians, and nongraduate technicians by years since graduation for all industry. The graph shows that the average technical school graduate is able to achieve the salary of a graduate engineer.

Source: Salaries of Engineering Technicians, Engineering Manpower Commission of Engineers Joint Council, (New York: The Council, 1966), p. 7.

CHAPTER X

RECOMMENDATIONS

1. Oklahoma should make a major effort in occupational education beyond the high school.

The state cannot afford the waste of both money and human resources inherent in an educational system that serves effectively less than half of the young men and women who have the capability for education beyond high school. Oklahomans believe in higher education! If higher education merits this support and confidence, the leadership should be able to provide the necessary mechanisms to make occupational education a strong and viable part of the total system.

2. All post high school occupational education and the supporting services of a manpower development program should be coordinated through one administrative unit.*

The social and economic potentials of a unified system of manpower development are enormous. It would be possible, with such a system, to reach twice as many people annually as are being graduated by all of the higher education institutions in the state. Oklahoma, by taking positive action now, can consolidate the separate efforts that have been made in technical education throughout the state. By incorporating certain supporting services in manpower research and industrial planning, the system could be expanded on a planned schedule. Manpower needs in new and expanding industries could be met by bringing to bear the best talent in the state at the point of need--at any time and in any part of the state. Most significant of all, a unified system would give real visibility to occupational education--the elements of status and respectability that are so desperately needed.

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* Alternative plans for establishing a central administrative unit are discussed at the end of this section.

3. Separate funding should be provided for occupational education services.

Little significant improvement will be made in this field of education until it is recognized as an entity, fully equivalent to any other unit of higher education, and funded accordingly. If and when this unique type of education reaches the proportions recommended by those who have made extensive studies of the need, occupational education programs in Oklahoma will enroll at least 25,000 students annually. The annual cost of instruction alone could be $20 million dollars.

At present, occupational programs are funded separately in only two institutions, Oklahoma State Tech at Okmulgee and the Oklahoma State University Technical Institute in Oklahoma City. All other programs operate with funds appropriated for higher education in general, supplemented with federal funds supplied through the State Department of Vocational-Technical Education.

4. All existing institutions and programs will be needed to provide the range of services that will be required.

A substantial investment has been made in the twelve state institutions that now provide technical education services. The current combined output of these institutions provides only about

40 per cent of the state's need for technicians. Some of these programs should be expanded, especially those in urban areas where a substantial evening program can be offered for part-time students.

The strength of any educational system is in the men and women who make up the administrative and teaching staff of established institutions. Oklahoma is fortunate to have a nucleus of well-qualified and experienced specialists in technical education. These professionals, together with the resources and facilities at their respective institutions, will be invaluable in developing a statewide program.

5. An expansion of occupational education should be programmed for the state's urban areas as soon as possible.

Facilities for occupational education are expensive. Schools in urban areas normally utilize their facilities to a maximum extent, with the result that the per-student cost of instruction is relatively low. It is usual in such cases to find more students enrolled in evening courses than in the full-time day programs. Furthermore, urban schools can provide a wide range of program offerings, many of which are mutually supportive, thus adding strength to the total program.

The Oklahoma State University Technical Institute in Oklahoma City exemplifies both the effectiveness and the efficiency of an urban technical school. With limited facilities and a minimum budget this school has grown steadily and is now planning an expansion program. Both full-time and evening programs are offered leading to the associate degree in technology. The institute also provides a variety of preemployment training programs and special courses for employed persons.

A technical school is needed in the Tulsa metropolitan area. Feasibility studies should be made in other areas of the state to determine if additional technical schools are needed or if new programs should be added in existing schools.

6. A planned program of activities should be conducted to inform high school counselors of occupational education opportunities.

A check of entering students at four schools in September, 1967, showed that two-thirds of these students obtained no counseling in high school as to occupational education opportunities. Much information is available to show that certain students are better served by occupational training than by any other kind of post-high school education. Special institutes for counselors should be conducted with the assistance of Oklahoma business and industry representatives.

7. A central information service should be established to bring Oklahoma employers and graduates of Oklahoma schools together.*

Graduates of Oklahoma schools are leaving the state because of the aggressiveness of out-of-state recruiters. At the same time, Oklahoma employers hire many more technicians each year than are being produced in state schools. It is apparent that the communication between schools and employers is inadequate. A central source of information could do a great deal to bring employers and graduates together and reduce the loss to the state of valuable trained manpower.

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* The work of a central information service should be coordinated with the services of the Oklahoma Employment Security Commission to avoid any duplication of effort.

A CENTRAL ADMINISTRATIVE UNIT FOR MANPOWER DEVELOPMENT

Establishing a central administrative authority is a responsibility of the state legislature. The legislature must, first of all, make the basic decision to establish and fund a manpower development program in Oklahoma. If the decision is made to take positive action, the second major consideration will be an administrative plan.

The following ideas are presented to assist in formulating a plan of action. It is recommended that careful study be made of these and other factors that might determine the ultimate effectiveness of centralized administrative authority for occupational education and manpower development.

Services Needed in a Program of Manpower Development

The essential services to be provided by a statewide manpower development program are: (1) manpower research, (2) industrial planning services, and (3) occupational education. In Oklahoma, the responsibility for these services is lodged in a number of separate agencies and boards of control and institutions.

Bringing these three services together in a central administrative unit would greatly reduce the time required for the educational system to adjust to changing manpower needs. Special training programs for new industries could be provided quickly in any area of the state.

Research, planning, and education for industry represent both short and long range needs. A systems approach is required to insure efficient and long range growth. The primary elements of a manpower development system are:

A. Manpower Research

1. Long range planning for the manpower needs of existing business, industry, and government
2. Local and state studies of available manpower--both trained and untrained
3. Central manpower information services for employers
4. Identification of emerging occupations

B. Industrial Planning Services

1. Manpower planning services for new industries
2. Feasibility studies for industrial plant location
3. Occupational analysis to identify training needs
4. Coordination of cooperative and in-plant training programs

C. Occupational Education

1. Full-time preemployment training programs beyond high school leading to certificates and associate and baccalaureate degrees
2. Special training for new industries
3. Part-time continuing education for employed persons
4. Advanced technical and professional training for teachers and school administrators

It should be obvious that the educational component of a manpower program is the most complex element. In Oklahoma, careful management will be required to make the best use of existing institutions and programs. The state's most valuable asset is the experienced personnel in these institutions. For this reason the twelve institutions currently offering occupational programs must be considered in any overall administrative plan, along with others that have plans for such programs. A consortium of these institutions could be formed to assist in developing a statewide plan of operation.

Agencies and Institutions Presently Engaged in Manpower Research, Industrial Development, and Occupational Education

A. Manpower Research

1. The State Division of Vocational Education Research Coordinating Unit
2. The Oklahoma State University
    - Research Foundation
    - Manpower Research Center
3. University of Oklahoma, Bureau of Business Research
4. The Oklahoma Economic Development Foundation
5. Oklahoma Employment Security Commission

B. Industrial Planning Services

1. State Industrial Development and Parks Department
2. Oklahoma Economic Development Foundation
3. Oklahoma Employment Security Commission
4. Economic Development Districts

C. State Supported Occupational Education Services

1. Regents for Higher Education
2. The Oklahoma State University
    - Technical Schools at Stillwater, Oklahoma City, and Okmulgee
    - Teacher Education Services in Technical, Business and Office, Distributive, Agriculture, and Home Economics
    - The Extension Division
3. Eight State Junior Colleges
4. Langston University
5. State Department of Vocational-Technical Education
6. The University of Oklahoma
    - Medical Center
    - Teacher Training Services in Business and Office, and Home Economics
7. The Oklahoma Medical Center

The vital element in manpower development is training. A central authority could coordinate the occupational education programs and services of the several institutions throughout the state, assist in planning new programs, and provide the flexibility that is needed to set up special training programs for new or expanding industries in any section of the state.

Manpower research and industrial planning services are staff functions. Developing these services is primarily a matter of recruiting technical specialists and providing a framework in which they can be productive. It is essential, however, that the work of these specialists be directly reflected in action programs of manpower training. Here again, a central administrative authority is required. It would be necessary, of course, to coordinate the activities of these specialists with those of other state agencies engaged in industrial development and employment services.

At least two alternatives have been suggested for a system of manpower development: (1) a central board of control and (2) a division of the Oklahoma State University.

A System of State Financed Schools Operated by a Central Board of Control

This system would require that a new board of control be established and funded with a special appropriation. A system of state schools would be needed. It is probable that changes in the state's constitution would be required to permit the granting of college credit and associate degrees, since this authority is now vested in the Regents for Higher Education. Consideration would need to be given to transferring to this board the technical schools now operated by the Oklahoma State University in Oklahoma City and Okmulgee. At least one new technical school should be established in the Tulsa metropolitan area. Contractual arrangements with state junior colleges would be required to insure support for technical programs offered in these institutions.

Manpower research and industrial planning services would need to be established by the board of control to insure close and continuous coordination with the educational program. Close cooperation should be maintained with other state agencies that have responsibilities for industrial and economic development.

A serious problem could arise under this system in regard to accreditation. It is highly probable that regional accreditation could not be obtained for institutions or programs not under the control of the Regents for Higher Education. Without such accreditation it would not be possible to set up the vertical structure so essential to the long range success of the system. It would be extremely difficult to attract the quality of staff and students needed for a sound program unless this vertical structure could be established.

An Administrative Unit Established by the Oklahoma State University to Provide a Coordinated System of Manpower Development

The three essential elements of manpower development; research, industrial planning services, and occupational education, are within the sphere of activities of a land grant university. At present, however, as they relate to occupational education, these three services are not coordinated administratively at the Oklahoma State University. Occupational education is provided by technical schools at Okmulgee, Oklahoma City, and on the campus at Stillwater. Manpower research is being conducted by the several colleges on the campus as are teacher education services for vocational and technical teachers.

Although the Oklahoma State University has provided state and national leadership in technical education at the post-high school level for many years, no attempt has been made to develop a coordinated system of manpower development. University colleges, schools, and departments--largely independent of each other--have, however, made a major contribution to the state's manpower supply. Probably no other land grant university in the nation offers a wider range of occupational education services. More than 3,500 students are presently enrolled in the Oklahoma State University system, ranging from courses in the skilled trades to professional training for teachers and administrators.

Although manpower research is relatively new at the university, studies of state and national significance have been made. The new Manpower Research and Training Center is unique in the nation in that interdisciplinary manpower researchers are trained in a two year program at the master's degree level.

A system of occupational education operating within a university structure would have many advantages. Foremost among these would be a high degree of visibility. Recognition of occupational education by the academic community is an absolute requirement if the state is to develop a comprehensive system of education that does not discriminate against those who do not pursue a baccalaureate degree. Working with and through a consortium of state junior colleges, the university could develop a state plan of post-high school occupational education services, enter into contracts for special training programs, develop training guides, and provide other support services, as needed.

Manpower research is especially appropriate for a land grant university. The increasing mobility of the work force is creating complex problems. Rural to urban movement, migration from state to state, commuting practices, and similar factors have a direct bearing on educational planning. They are especially significant for occupational education. The research resources of a university would strengthen a manpower development program at many points.

Industrial development services would be relatively easy to provide in any system that included the necessary facilities and staff to follow through with training programs for industry. Here again, the resources of a university staff would be extremely significant. Industrial education specialists along with engineers, economists, and other technical specialists could work closely with new or existing industries to plan manpower requirements, training schedules, and in-plant training courses.

A basic requirement for any state system of manpower development will be administrative and teaching personnel. The university has exceptional strength in this area. Teacher education services are offered by four of the colleges on the campus at Stillwater. Extension courses are offered at several locations throughout the state for employed teachers. A coordinated manpower development program could do much to strengthen the total teacher education program by making the professional program a part of a vertical structure that would include technical schools and state junior colleges. Associate degree graduates of occupational education programs who qualify for admission to professional schools could be prepared for teaching and administrative positions in the state system.

It should be reemphasized that a major reorganization of the university's existing services would be required to develop this coordination. If this alternative plan for a manpower development system is to be considered, the university should be requested to present a detailed plan of operation showing organization, programs, staffing, facilities, and finances required.

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APPENDIX A

SOURCES OF DATA, AND EXPLANATION OF SPECIAL PROCEDURES

(1) Table 48, U.S. employment by industry, 1963: *Statistical Abstract of the United States, 1964*: Table 299, pp. 221-23. (The original source for this is the Bureau of Labor Statistics.) Two specific problems arose relative to the need to get the categories to fit in with those of the BLS estimates. (a) The *Statistical Abstract* does not break down State and Local government into its two components. The total was allocated on a basis of State and Local government employment reported in the *1964 Statistical Abstract*, p. 435. (b) The BLS table's category for "Services and Other" does not fit well with source for total employment. The employment figure for "Other Industries" is the sum of employment for "Wholesale and Retail Trade," "Finance, Insurance, and Real Estate," and "Service and Miscellaneous." This was allocated to SIC categories 73, 807, 86, and 891 on the basis of the relation of those groups to the same total group reported in Bureau of the Census, *County Business Patterns, 1964*. "All Other Nonmanufacturing" is then strictly a residual category.

(2) Table 48, Oklahoma employment by industry class, 1965: The basic source for this data is the Oklahoma volume of Bureau of the Census, *County Business Patterns, 1965*. This reports number

of employees on the mid-March payroll, and also provides information on the number and size of establishments. Data are collected as a by-product of the Social Security program. The source does not report information on government employees, self-employed workers, farm workers, and domestic servants. This, however, is not a major drawback, because supplemental information can be derived from the Oklahoma Employment Security Commission's Handbook of Oklahoma Employment Statistics, 1939-1966 showing estimated total employment by major industry category. Total state employment from that source for March, 1965 was 865,000, while County Business Patterns covered only 476,000, a discrepancy of 389,000. Almost all of this discrepancy can be accounted for by the 386,000 workers reported by the OESC categories of "agriculture," "domestic service," "self-employed," "unpaid family workers," and "government."

In order to develop figures for Oklahoma employment according to categories comparable to the BLS table, the March, 1965 OESC figure for government employment was added to the employment data reported in County Business Patterns. The figures for "state" and "local" government employment were obtained by allocating the OESC figure for "state and local" on the basis of the 1962 ratio derived from the Bureau of the Census, Census of Governments, 1962.

The usefulness of County Business Patterns data is reduced by the fact that establishment data are not reported for cases in which individual establishment identification would be obvious. It is frequently possible to infer something about what is not reported (indicated by a "D" in the source). For example, there is no information except number of establishments given for the total state for SIC categories 19 (ordnance and accessories) and 22 (textile mill products). Because these are both subcategories under manufacturing, it is possible to compare reported total manufacturing employment with the sum of the other reported subcategories, and infer that the remaining employment must fall in these two industry groups.

Since County Business Patterns does publish number of reporting units by employee size class, a rough estimate can be obtained concerning how the residual employment should be allocated between these two groups. For group 22 it was assumed that the actual establishment employment was at the middle of the employment size class. After multiplying number of establishments by appropriate mid-class figures and adding, it was possible to subtract the estimated total for group 22 from the residual and estimate the employment in group 19. This was necessary because one establishment in the latter group was reported in the "500 or More" employee size class, whereas all establishments in group 22 were in classes which were not open ended.

(3) Tables 51 and 52, Employment by Industry Class, Oklahoma City SMSA and Tulsa SMSA, 1965:

The basic source for this data is the Oklahoma volume of the Bureau of the Census County Business Patterns, 1965. However, the estimation of government employment for the three major categories utilized three independent sources. The estimate of total government employment was derived from the Oklahoma Employment Security Commission, Handbook of Oklahoma Employment Statistics, 1939-1966. This applied to the month of March, 1965. The estimate of federal government employment was derived from U.S. Congress, Joint Committee on Reduction of Nonessential Federal Expenditures, Federal Civilian Employment by County, 87th Congress first session, Senate Committee Print (Washington: U.S. Government Printing Office, 1961). This source, which presented data for 1960 rather than 1965, indicated that 62 per cent of all federal employees working in Oklahoma were employed in the Oklahoma City SMSA, and 7 per cent were employed in the Tulsa SMSA. These percentage figures were used as allocators against the estimate of federal government employment reported in Table 50. Figures for local government employment were derived by developing allocators to apply to the figures from Table 50 on the basis of the pattern of local government employment for 1962 reported in the U.S. Bureau of the Census, Census of Governments, 1962. The figure for state government employment was then obtained by subtracting the estimates of federal and local employment from the total government employment figure. The estimate of state government employment for the Tulsa SMSA derived in this manner is uncomfortably low.

The application of the SIC classes reported in County Business Patterns for the Oklahoma City and Tulsa SMSA's is essentially the same as that utilized with respect to Table 50 and described above. The County Business Patterns disclosure rule, however, created more problems with respect to using the SMSA data than was the case for the state data. In all cases, however, it was possible to develop reasonable estimates of employment from information contained in the source. Where such estimates had to be made, this is indicated by the footnote "b." The general procedure utilized was to assume that where total employees for a SIC group was not reported a reasonable estimate of employment could be derived by assuming that the establishments reported for the various size classes employed a number of workers falling in the middle of the size class. In some instances it proved fruitful to rely on the information presented for Tulsa County and Oklahoma County, rather than to utilize the table reporting information for the Tulsa and Oklahoma City SMSA's. Two cases of estimation deserve special mention. Employment for "ordnance and accessories" for the Tulsa SMSA could be estimated readily because this area contains the state's only establishment in this group employing 500 or more workers. Of the four other establishments in this group, three had less than seven employees and one fell in the 20-49 employee size class. It was thus reasonable to assume that all except about 40 workers in this group were in the Tulsa SMSA.

For the "administrative and auxiliary" category under manufacturing for the Tulsa SMSA, two establishments were reported with 500 or more employees. Since there were only six establishments in this particular class for the state as a whole, and these employed 9,019 workers, it was assumed that the two Tulsa SMSA establishments in this category employed the number of workers equal to the appropriate state average of 1,503 per establishment.

(4) Tables 50, 51, and 52, Procedures Used in Obtaining Estimates of Employment of Technicians:

Table 49 contains ratios relating technician employment to total employment for the various SIC classes. The estimates for Tables 50, 51, and 52 were developed by applying the appropriate component ratios, and the technician employee totals were built up from these components. However, in the cases of the "administrative and auxiliary" classes under "manufacturing," and "transportation, communication and electric and gas and sanitary services," the overall industry group percentages were utilized for the four technician components.

APPENDIX B

LIST OF COUNTIES IN EACH STATE ECONOMIC AREA

Panhandle (SEA 1)

Beaver
Cimarron
Custer
Dewey
Ellis
Harper
Roger Mills
Texas
Woods
Woodward

North Central (SEA 2)

Alfalfa
Blaine
Garfield
Grant
Kay
Kingfisher
Major
Noble

Northeast (SEA 3)

Craig
Mayes
Nowata
Ottawa
Rogers
Washington

Southwest (SEA 4)

Beckham
Caddo
Comanche
Cotton
Grady
Greer
Harmon
Jackson
Kiowa
Tillman
Washita

Central Oklahoma - Western (SEA 5)

Garvin
Lincoln
Logan
McClain
Pawnee
Payne
Pottawatomie

Central Oklahoma - Eastern (SEA 6)

Coal
Hughes
Okfuskee
Pontotoc
Seminole

South Central (SEA 7)

Bryan
Carter
Choctaw
Jefferson
Johnston
Love
Marshall
Murray
Stephens

Eastern Oklahoma - Arkansas River (SEA 8)

Haskell
McIntosh
Muskogee
Okmulgee
Sequoyah
Wagoner

Ouachita Mountains - Western (SEA 9)

Atoka
Latimer
LeFlore
McCurtain
Pittsburg
Pushmataha

APPENDIX B (Continued)

Oklahoma Ozark (SEA 10)
- Adair
- Cherokee
- Delaware

Tulsa SMSA
(SEA A and SEA C)
- Tulsa
- Osage
- Creek

Oklahoma City SMSA
(SEA B and SEA D)
- Cleveland
- Oklahoma
- Canadian

APPENDIX C

COMPARISON OF INDUSTRY CLASS AS LISTED IN TABLES 49 AND 50 WITH INDUSTRY CLASS AS LISTED IN *GROWTH PATTERNS IN EMPLOYMENT BY COUNTY* AND S.I.C. CODES

Industry Class as Listed in Tables 49 and 50	Industry Class as Listed in *Growth Patterns*	S.I.C. Codes
Agriculture, Factory & Fisheries	Agriculture Forestry & Fisheries	01, 02, 07 (except 0713), 08, 09
Mining	Mining	10, 11, 12, 13, 14
Construction	Construction	15, 16, 17
Manufacturing	Food & kindred products mfgr.	0713, 20
	Textile mill products mfgr.	22
	Apparel mfgr.	23
	Lumber, wood products furniture mfgr.	24, 25
	Printing & publishing mfgr.	27
	Chemicals & allied products mfgr.	28
	Electrical and other machinery mfgr.	35, 36
	Motor vehicles & equipment mfgr.	371
	Other transportation equipment mfgr.	37 (except 371)
	Other and miscellaneous mfgr.	19, 21, 26, 29 30, 31, 32, 33 34, 38, 39
Taxable Insurance & Real Estate	Finance, Insurance and Real Estate	60, 61, 62, 63, 64, 65, 66, 67
Transportation	Railroads and railway express	40
	Trucking and warehousing	42
	Other transportation	41, 44, 45, 46, 47

APPENDIX C (Continued)

Industry Class as Listed in Tables 49 and 50	Industry Class as Listed in *Growth Patterns*	S.I.C. Codes
Communications and Public Utilities	Communications	48
	Utilities & Sanitary Service	49
Wholesale & Retail Trade	Wholesale Trade	54
	Food & Dairy Products Stores	58
	Other Retail Trade	52, 53, 55, 56, 57, 59
Services	Hotels and other personal services	70, 72
	Private households	88
	Business & repair service	73, 75, 76
	Entertainment, recreation services	80, 81, 82, 84 86, 89
Government	Public administration	91 (except 9190 part) 92, 93
Other	Armed Forces	9190 part
	Industry not reported	99

APPENDIX D

METHODOLOGY FOR SELECTING ESTABLISHMENTS FOR THE STUDY OF EMPLOYMENT PRACTICES OF TECHNICAL PERSONNEL IN OKLAHOMA

The methodology for this study was initiated in Appendix D of Occupational Education Beyond the High School in Oklahoma[1] released by the Research Foundation at the Oklahoma State University in September 1967. Dr. R. L. Sandmeyer and Dr. Larkin B. Warner, Department of Economics, Oklahoma State University, were associate investigators on the above research project. The efforts of Sandmeyer and Warner were related to estimating current technician employment in Oklahoma by using national percentages of technician employment by industry class as established by the Bureau of Labor Statistics. Their overall purpose of estimating technician employment was to provide a foundation for educational program planning in technician areas and identify establishment for field survey purposes. The concentration of technician manpower by technical field and industry class was subsequently estimated for Oklahoma. It is very important that the user of these estimates be familiar with the detailed description of data sources and estimating procedures presented in Appendix A of the study.

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[1] Maurice W. Roney and Paul V. Braden, Occupational Education Beyond the High School in Oklahoma (Stillwater, Oklahoma: Research Foundation, Oklahoma State University, September 7, 1967), pp. 180-184.

Sandmeyer and Warner estimated that there were between nine and ten thousand technicians in Oklahoma. The distribution of these technicians by technician category was found to approximate the national distribution and was roughly as follows: Engineering and physical sciences (50 per cent), drafting (25 per cent), life sciences (7 to 8 per cent), and "other" technicians (15 per cent).

The Oklahoma City and Tulsa Standard Metropolitan Statistical Areas were found to account for almost two-thirds of the estimated employment of technicians. Furthermore, the technicians were found to be concentrated in Oklahoma by industry division as follows: Manufacturing (27.5 per cent); government (32.5 per cent); transportation, communication, gas, and sanitary service (7.2 per cent); mining [including petroleum](7.3 per cent); construction (3.4 per cent), and other industries (22.1 per cent).

Population of the Study

It was decided because of constraints with respect to budget, time, and research manpower to discard any attempt at random sampling with the exception of the manufacturing sector. Furthermore, the study of the life science technician category was deferred for separate consideration at a later date. The selection of establishments within the above constrains would, of course, concentrate on large establishments in the metropolitan areas of Oklahoma City and Tulsa.

The 50 Oklahoma employers for which data was analyzed represented approximately 60 per cent of Oklahoma engineering and physical science nonfarm employment and probably 60 per cent of the engineering and physical science technicians and draftsmen since they support these professionals. There was no effort in this report to directly generalize beyond the 50 firms who are reported.

Manufacturing

The new addition of the Directory of Oklahoma Manufacturers[2] published by the Industrial Development and Parks Department, Oklahoma City, provided the information needed to draw a sample of establishments from the manufacturing sector. As was pointed out earlier in Table 49, Chapter 7, about one quarter of Oklahoma's technicians were employed in manufacturing. All manufacturing establishments with 200 or more employees were selected for the conferences--along with a 50 per cent sample of the 100-199 employee class and a 25 per cent sample of the 50-99 employee class. No effort was made in Chapter VIII of this study to directly generalize from the above sub-samples. The following shows the breakdown of establishments in the manufacturing sector.

MANUFACTURING ESTABLISHMENTS

Employee Size	No.	Emplrs.of Techns	No. in Sample	% in Sample	No. Retd.	% Retd.
500 and over	29	29	29	100	14	48.3
400-499	12	12	12	100	4	33.3
300-399	23	23	23	100	3	13.0
200-299	55	33	33	100	2	6.0
100-199	128	74	37	50	1	3.0
50-99	177	88	22	25	2	9.1
TOTALS	424	259	156		26	

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[2] Oklahoma Industrial Development and Parks Department, Oklahoma Directory of Manufacturers and Products, (Oklahoma City: 1967).

Other Activity Areas

All petroleum establishments were treated as a single group. Many petroleum establishments indicated that somewhat equal concern was given to mining and manufacturing activities. Most all petroleum firms (8 out of 10 that reported) were in the 500 and over employee class.

The local, state, and federal government establishments were selected as follows:

1. Local government--all city governments representing 25,000 population or over (5 out of 11 that reported)
2. State government--State Highway Department
3. Federal government--five establishments including OCAMA (3 out of 5 that reported)

Service industries were completely excluded; but one establishment previously considered manufacturing reported that their primary activity was service.

The information sheets used in this study are shown as Appendix F. As mentioned in Chapter VIII, the information sheets were completely explained during the conferences.

APPENDIX E

ORGANIZATIONS REPRESENTED AT INDUSTRIAL EMPLOYMENT CONFERENCES IN OCTOBER, NOVEMBER, AND DECEMBER OF 1967

A.S.T.M.E.
1427 North Tacoma Avenue
Tulsa, Oklahoma

AVCO
10700 East Independence
Tulsa, Oklahoma 74115

Aero Commander
5001 North Rockwell
P.O. Box 118
Bethany, Oklahoma 73008

American Airlines
3800 North Mingo Road
Tulsa, Oklahoma 74116

Bell Oil and Gas
P.O. Box 188
Northeast of City
Ardmore, Oklahoma 73401

Black, Sivalls and Bryson, Inc.
P.O. Box 1714
2131 Westwood Boulevard
Oklahoma City, Oklahoma 73101

Blue Bell, Inc.
Harvey Road at Strothers
Seminole, Oklahoma 74868

Braden-Aermotor
800 West Dallas
Broken Arrow, Oklahoma

Brockway Glass Company
Northeast of City
P.O. Box 1504
Muskogee, Oklahoma 74401

Capitol Steel and Iron
1726 South Agnew Avenue
P.O. Box 26487
Oklahoma City, Oklahoma 73119

Carson Machine and Supply Company
202 Southeast 29th Street
Oklahoma City, Oklahoma 73129

Champlin Petroleum Company
Northeast Edge of City
P.O. Box 552
Enid, Oklahoma 73701

Cities Service Oil Company
P.O. Box 300
Tulsa, Oklahoma

Office of City Manager
City of Bartlesville
Bartlesville, Oklahoma

Office of City Manager
City of Enid
P.O. Box 1768
Enid, Oklahoma

Office of City Manager
City of Midwest City
300 Mid-American Building
Midwest City, Oklahoma

Office of City Manager
City of Muskogee
Muskogee, Oklahoma

Office of City Manager
City of Oklahoma City
200 North Walker
Oklahoma City, Oklahoma

Office of City Manager
City of Shawnee
P.O. Box 1448
Shawnee, Oklahoma

Office of City Manager
City of Stillwater
723 South Lewis
Stillwater, Oklahoma

Office of City Government
City of Tulsa
Tulsa, Oklahoma

Civil Service Commission
210 Northwest 6th Street
Oklahoma City, Oklahoma

Continental Oil Company
100 South Pine Street
P.O. Box 1267
Ponca City, Oklahoma 74602

Crane Carrier Company
1150 North Peoria Avenue
P.O. Box 5008
Tulsa, Oklahoma 74104

Dover Corporation
Norris Division
Tulsa, Oklahoma

Dowell Division of Dow Chemical
Company
1579 East 21st Street
Tulsa, Oklahoma 74110

Federal Aviation Agency
P.O. Box 25082
Oklahoma City, Oklahoma

Flint Steel Corporation
2440 South Yukon Avenue
P.O. Box 1289
Tulsa, Oklahoma 74101

General Electric Company
4000 Northwest 39th
Oklahoma City, Oklahoma 73112

Georgia-Pacific Corporation
P.O. Box 579
Pryor, Oklahoma 74361

B. F. Goodrich
1000 Goodrich Boulevard
Miami, Oklahoma 74354

KVOO-TV News
P.O. Box 1349
Tulsa, Oklahoma

Kerr-McGee Corporation
133 Robert S. Kerr Avenue
Oklahoma City, Oklahoma

LSI Service Corporation
3100 North Interstate 35
Oklahoma City, Oklahoma

Lockheed-California Company
Plant 09, Box 800
McAlester, Oklahoma

McDonnell Douglas Corporation
200 North Memorial Drive
P.O. Box 1119
Tulsa, Oklahoma

Macklanburg Duncan Company
4041 North Santa Fe Avenue
P.O. Box 1197
Oklahoma City, Oklahoma

Manpower Inc.
801 South Detroit
Tulsa, Oklahoma

Midwestern Instruments, Inc.
41st and South Sheridan Road
P.O. Box 7509
Tulsa, Oklahoma 74105

Mobil Oil Corporation
120 Robert S. Kerr Avenue
Oklahoma City, Oklahoma

Lee C. Moore Corporation
1105 North Peoria Avenue
P.O. Box 216
Tulsa, Oklahoma 74104

Muskogee Iron Works
Frankfort Avenue and Spaulding
Boulevard
P.O. Box 188
Muskogee, Oklahoma 74401

National Tank Company
3100 Charles Page Boulevard
P.O. Box 1710
Tulsa, Oklahoma 74101

North American Rockwell Corporation
Route 69 Bypass, Northeast
McAlester, Oklahoma 74501

North American Rockwell Corporation
P.O. Box 51308
Tulsa, Oklahoma

Oklahoma Aerotronics
632 Pennsylvania Avenue
Hartshorne, Oklahoma 74547

Oklahoma City Air Material Area
3000 South Douglas Boulevard
Oklahoma City, Oklahoma 73150

Oklahoma City Chamber of Commerce
Skirvin Towers
Oklahoma City, Oklahoma

Oklahoma Gas and Electric
P.O. Box 321
Oklahoma City, Oklahoma

Oklahoma Natural Gas Company
P.O. Box 871
Tulsa, Oklahoma

The Oklahoma Publishing Company
500 North Broadway
P.O. Box 25125
Oklahoma City, Oklahoma 73102

Pittsburg Plate Glass Company
East Edge of City, Works No. 10
Henryetta, Oklahoma 74437

Pan American Petroleum
P.O. Box 591
Tulsa, Oklahoma

Phillips Petroleum Company
432 Frank Phillips Building
Bartlesville, Oklahoma

Republic Supply Company
P.O. Box 640
Oklahoma City, Oklahoma

John Roberts, Inc.
2500 South McGee Drive
Norman, Oklahoma 73069

Robberson Steel Company
1401 Northwest 3rd Street
P.O. Box 25855
Oklahoma City, Oklahoma 73101

Seismograph Service Corporation
6200 East 41st Street
P.O. Box 1590
Tulsa, Oklahoma

Sequoyah Refining Corporation
P.O. Box 1300
Ponca City, Oklahoma 74602

Shawnee Steel Company
700 East Santa Fe Shop Road
P.O. Box 1344
Shawnee, Oklahoma 74801

Skelly Oil Company
P.O. Box 1650
Tulsa, Oklahoma

Southwestern Bell Telephone
707 North Robinson
Oklahoma City, Oklahoma

State Highway Department
The Jim Thorpe Building
Capitol Complex
Oklahoma City, Oklahoma

Sunray DX
South Union Avenue at West 17th Street
P.O. Box 2039
Tulsa, Oklahoma

Sylvania Electric Company
P.O. Box 1809
Shawnee, Oklahoma

The Tulsa Tribune
P.O. Box 1770
Tulsa, Oklahoma

Tulsa Chamber of Commerce
616 South Boston
Tulsa, Oklahoma

U.S. Army Corps of Engineers
P.O. Box 61
Tulsa, Oklahoma

U.S. Bureau of Mines
P.O. Box 1398
Bartlesville, Oklahoma

U.S. Gypsum
Southeast Edge of City
P.O. Box 187
Southard, Oklahoma 73770

Unit Parts Company
4600 Southwest 59th Street
P.O. Box 1921
Oklahoma City, Oklahoma 73135

University Sound
9500 West Reno
Oklahoma City, Oklahoma

Vickers Tulsa Products Division
731 East 1st Street
Tulsa, Oklahoma

W and W Steel Company
1730 West Reno Avenue
Oklahoma City, Oklahoma 73101

WABCO Drilling Equipment Division
2215 S. VanBuren
Enid, Oklahoma 73701

Western Electric Company, Inc.
6555 West Reno Avenue
Oklahoma City, Oklahoma 73101

Yuba Heat Transfer
3519 Dawson Road
Box 3158
Tulsa, Oklahoma 74150

Note: List does not include representation from several educational institutions.

APPENDIX F

____
Date

EMPLOYMENT PRACTICES CONCERNING TECHNICAL PERSONNEL IN OKLAHOMA

The following information is needed to assist in planning a statewide program of occupational education beyond high school. In general, the kind of programs under consideration are on the post-high school level, two years in length, with a concentration in a field of specialization which normally requires a base of mathematics and science.

Responses to these questions should refer only to your organization or division. Responses will not be identified with individuals or organizations in any published materials or reports.

____
Name of Organization

____
If a division of an organization, specify division and report only for that division.

What is the approximate number of personnel (all types) presently employed in Oklahoma by your organization (or division)?

____
Number of Employees

____
Department or Office

____
Number and Street

____
City or Town

____
Representative Completing This Form

____
Representative's Title

____
Representative's Phone & Extension

Check major activity of organization (or division)

____ Manufacturing
____ Construction
____ Mining
____ Public Utilities
____ Other (please specify) ______________________________
____ Trade (wholesale or retail)
____ Finance-Insurance-Real Estate
____ Service
____ Government

1. Engineering and Scientific Personnel

A. What is the approximate number of personnel presently employed in engineering and physical scientist job classifications?

______ Number of Engineers ______ None

______ Number of Physical Scientists ______ None

B. Of those presently employed in engineering and physical scientist job classifications, what number have

Engineering Degrees	Physical Science Degrees	Other Education
(1) Ph.D. ______	(4) Ph.D. ______	(7) Non-Technical Bachelor's Degree ______
(2) M.S. ______	(5) M.S. ______	(8) No Bachelor's Degree ______
(3) B.S. ______	(6) B.S. ______	

2. Technical Personnel (Semi-professional)

A. What is the approximate number of personnel presently employed in your organization in semi-professional technical positions (engineering or physical science related)?

______ Number ______ None

B. Of the above number, how many have

(1) Bachelor's degrees ______ Number

(2) Two years of specialized post-high school technical training (for example, electronics, design, metallurgy) ______ Number

(3) One to three years of general college education (such as a liberal arts program in a junior college) ______ Number

(4) No formal post-high school education ______ Number

(5) Less than high school completion ______ Number

3. Current Technician Employment Practices

A. From what sources does your organization fill semi-professional technical positions? (Rank 1 through 5, from most to least important)

( ) State Employment Office

( ) Private employment agencies

( ) Junior colleges

( ) Technical institutes

( ) Four-year colleges or universities

( ) Upgrading presently employed personnel

( ) Walk-ins

( ) Advertisements in newspapers, trade journals, etc.

( ) Employee referrals (recommendations from employees)

( ) Other sources (please specify) ____________________

____

B. Do you primarily fill semi-professional technical positions

( ) With recent graduates of 2-year post-high school technical programs?

( ) With experienced technicians?

C. What geographic location is your primary source of technicians?

( ) Oklahoma

( ) Other states

D. Do you actively recruit graduates of 2-year specialized post-high school technical programs? ________ Yes ________ No

E. Do you have positions for which a 2-year post-high school technical graduate is given employment preference over those with other educational backgrounds (including non-technical B.S. degrees)? ________ Yes ________ No

F. For those who answered question 3E YES, rank the following items which reflect your reasons for giving employment perference to 2-year post-high school graduate technicians. (Rank 1 through 4, from most to least important)

( ) He is productive with a minimum of on-the-job training

( ) Has potential to move up to positions of increased responsibility

( ) Has broad technical background which permits flexibility in job assignment

( ) Has educational background to keep current in his technical field

( ) Feels responsible for proving himself on the job

( ) Other (please specify) ____________________________

( ) Other (please specify) ____________________________

G. For those who answered question 3E NO, please rank the following items which reflect your reasons for not giving preference to 2-year post-high school technical graduates. (Rank 1 through 4, from most to least important)

( ) Our organization does not have technical jobs

( ) Organization does not have job classifications between engineers and skilled trades or crafts which call for technicians

( ) A union bargaining unit covers technician jobs

( ) We are unfamiliar with the ability level and potential of technical school graduates

( ) Organizational policy is to upgrade present employees rather than to employ new technical personnel

( ) Organizational policy gives preference to B.S. degree holders

( ) Going rates for 2-year post-high school technician graduates are above our present pay scales

( ) All technical jobs are performed by engineers.

( ) Other (please specify) ____________________________

( ) Other (please specify) ____________________________

H. Does your organization hire 2-year post-high school technical graduates who have not fulfilled their military requirements? ______ Yes ______ No

I. Do technicians in your organization have a well-defined path for advancing to positions of increased responsibility and pay? ________ Yes ________ No

If yes, is path as a technician ____________ (please check) and/or

some other path ______________________________ (please specify)

J. Indicate in the appropriate space below the relations (if any) your organization had with the institutions listed during the 1966-67 school year.

QUESTIONS

INSTITUTIONS	Received information about their technical programs	Received information about their graduating technicians	Conducted tours for technical students	Sent literature explaining benefits of working with your organization	Extended invitations to technical students to visit your organization	Sent a list of job openings	Placed technical students in part-time work during school year or summer	Sent a representative to interview and recruit graduating technicians	Made job offers to graduating technicians	Hired technical graduates
Altus Junior College Altus										
Cameron State College Lawton										
Connors State College Warner										
Eastern Okla. A&M Colg. Wilburton										
Langston University Langston										
Murray State College Tishomingo										
Northern Okla. College Tonkawa										
Northeastern Okla. A&M Miami										
Oklahoma State Tech Okmulgee										
OSU Technical Institute Stillwater										
OSU Technical Institute Okla. City Branch										
Sayre Junior College Sayre										

4. Projected Technician Employment Practices

A. During the next 5 years do you anticipate

( ) An increase in the employment of 2-year post-high school technical graduates?

( ) No change in the employment of 2-year post-high school technical graduates?

( ) A decrease in the employment of 2-year post-high school technical graduates?

B. If you anticipate increasing the number of 2-year technically trained personnel in your organization during the next 5 years, which of the following factors will influence this increase?

( ) Growth of the organization's present activities

( ) Re-structuring of tasks which were formerly assigned to engineers

( ) Work becoming more technical

( ) Organization engaging in new activities

( ) Other (please specify) ______________________________

C. If you anticipate a decrease, why?

( ) Decrease in organization's present activities

( ) Use of automated equipment

( ) Re-structuring of tasks so that they can be done by persons with less training

( ) Other (please specify) ______________________________

D. How many 2-year post-high school technical graduates, including additional positions and replacements, do you anticipate hiring over the next five years?

Technical Areas	Number Presently Employed	1968	1969	1970	1971	1972
Aeronautical	______	______	______	______	______	______
Chemical	______	______	______	______	______	______
Civil	______	______	______	______	______	______
Civil and Highway	______	______	______	______	______	______
Construction	______	______	______	______	______	______
Data Processing	______	______	______	______	______	______
Drafting and Design	______	______	______	______	______	______
Electronics	______	______	______	______	______	______
Fire Protection	______	______	______	______	______	______
Instrumentation and Process Control	______	______	______	______	______	______
Mechanical	______	______	______	______	______	______
Metals	______	______	______	______	______	______
Petroleum	______	______	______	______	______	______
Radiation	______	______	______	______	______	______
Refrigeration and Heating	______	______	______	______	______	______
Other ______ (specify)	______	______	______	______	______	______
Other ______ (specify)	______	______	______	______	______	______
Other ______ (specify)	______	______	______	______	______	______

If your organization has other divisions in Oklahoma, please list the name and location below

Division	**Location**
Division	**Location**
Division	**Location**

If you desire to make any additional remarks, please do so in the space provided below.

APPENDIX G

DEFINITIONS OF TERMS

Active Manpower Policy--An active manpower policy is the process embracing those principles and programs which aim to assist the individual to become fully employed in productive work of his choosing consonant with his aptitudes, talents, and interests under fair standards; to help sustain and rehabilitate the individual experiencing economic or personal hardship; and to help maintain the individual in as adaptable, flexible, and responsive a stance as possible to the changing requirements of the world of work.[86]

Adult Vocational Education--Instruction offered day or evening to adults or out-of-school youth over 16 years of age who are engaged in or are preparing to enter an occupation. Vocational education for adults is chiefly of an upgrading and updating nature, offered on a part-time basis, or of a retraining nature for persons displaced by automation or technological changes.[87]

Agri-business--An inclusive term which embraces a cluster of agricultural occupations pertaining to the business and/or management phases of manufacturing, servicing, processing, and distribution of the products going into and/or coming from farm production.

Apprentice Training--An organized system for providing young people with the manipulative skills and technical or theoretical knowledge needed for competent performance in skilled occupations. The program usually involves cooperation among school, labor, and management, since apprentices learn the skills of the craftsman through on-the-job work experiences and the related information in the classroom. The minimum terms and conditions of apprenticeship are regulated by state and local statutes or agreements.

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[86] Seymour L. Wolfbein, Employment, Unemployment, and Public Policy, (New York: Random House, 1965), p. 121.

[87] All definitions are from the following source unless otherwise noted: Definitions of Terms in Vocational-Technical and Practical Arts Education, American Vocational Association, (Washington: The Association).

Area Vocational School or Program--A school or program involving a large geographical territory usually including more than one local basic administrative unit. It offers specialized training to high school students, who are preparing to enter the labor market. It also provides vocational or technical education to persons who have completed or left high school and are available for full-time study. These schools are sponsored and operated by local communities or by the state.

Business Education--A program of instruction which consists of two parts: (a) office education, a vocational education program for office careers through initial, refresher, and upgrading education leading to employability and advancement in office occupations, and (b) general business education, a program to provide students with information and competencies which are needed by all in managing personal business affairs and in using the services of the business world.

Certificate of Completion (Certificate of training)--Written recognition granted to members of vocational classes upon satisfactorily completing the requirements of a course of instruction. Such certificates are presented when courses are not taken for credit towards graduation.

Community College--A junior college operated by the board of education of a local basic administrative unit (including the independent local board for one or more community colleges). Instruction is adapted in content, level, and schedule to the needs of the local community. (See junior college.)

Continuing Education--Adult education provided as an extension of college or university resources--through activities or media such as formal classes, correspondence study, radio, television, lectures, concerts, demonstration, and counseling--and designed to meet the unique educational needs of adults who have either completed or interrupted their formal education.[88]

Coordinator (Cooperative education)--A member of the school staff responsible for administering the school program and resolving all problems that arise between the school regulations and the on-the-job activities of the employed student. The coordinator acts as liaison between the school and employers in programs of cooperative education or other part-time job training.

Counselor, Guidance--An experienced and trained person who helps another individual to understand himself and his opportunities, to make appropriate adjustments, decisions, and choices in the light of his unique characteristics, and to initiate a course of training or work in harmony with his selection.

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[88] U. S., Department of Health, Education, and Welfare, Office of Education, Standard Terminology for Instruction in Local and State School Systems (Third Draft), (Washington: May, 1967), p. 667.

Distributive Education--A program of instruction in marketing, merchandising, and management. The program is concerned with training needed for purposes of updating, upgrading, career development, and operational management.

Distributive Occupations--Those occupations followed by proprietors, managers, or employees engaged primarily in marketing or merchandising of goods or services. Such occupations are labor standards of apprenticeship.....bring together employers and labor for the development of programs of apprenticeship and to cooperate with state agencies in the formulation of standards of apprenticeship. The act is administered by the Bureau of Apprenticeship and Training, U. S. Department of Labor.

Engineering Technician--An engineering technician is one whose education and experience qualify him to work in those areas of engineering which require the application of established scientific and engineering knowledge and methods, combined with technical skills, in the support of engineering or scientific activities toward the accomplishment of engineering objectives.[89]

Evening School--An institution that offers an organized program of courses for the convenience of adult students. Classes are held during the non-working hours of employed persons.

Follow-up Study, Vocational--A survey to determine what occupations the students and graduates of vocational education courses enter and how effective their training was in relationship to actual needs of the job.

Gainful Employment--Employment in a recognized occupation for which persons normally receive a wage, salary, fee, or profit.[90]

Guidance, Vocational--The process of assisting individuals to understand their capabilities and interests, to choose a suitable vocation, and to prepare for, enter, and make successful progress in it.

Industrial Arts Education--Instructional shopwork of a non-vocational type which provides general educational experiences centered around the industrial and technical aspects of life today and offers orientation in the areas of appreciation, production, consumption, and recreation through actual experiences with materials and goods. It also serves as exploratory experiences which are helpful in the choice of a vocation.

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[89] Engineering Manpower Commission of Engineers Joint Council, Salaries of Engineering Technicians, (New York: The Council, 1966), p. 13.

[90] U. S., Department of Health, Education, and Welfare, Office of Education, Standard Terminology for Instruction in Local and State School Systems (Third Draft), (Washington: May, 1967), p. 672.

Industrial Education--A generic term applying to all types of education related to industry, including industrial arts education, vocational industrial education (trade and industrial education), and much technical education.

Junior College--An institution of higher education which offers the first two years of college instruction, frequently grants an associate degree, and does not grant a bachelor's degree. Offerings include transfer and/ or terminal programs (with an immediate employment objective) at the post-secondary instructional level and also may include adult education programs. It is an independently organized institution (public or non-public) or an institution which is a part of the public school system or an independently organized system of junior colleges. The term does not refer to the lower division of a four-year institution, even if this lower division is located on a campus entirely different from the campus of the parent institution. (See community college.)

Manpower Development and Training Act--A federal act administered by the Department of Labor and the Department of Health, Education, and Welfare. Its function is the training of the unemployed and underemployed as well as the retraining of persons who are displaced due to automation and technological changes.

Manpower Policy--See Active Manpower Policy.

Noncredit Course--A course for which pupils do not receive credit applicable toward graduation or completion of a program of studies.[91]

Occupational Field--A group of recognized occupations having many similarities, including the following characteristics in common: the type of work performed; the basic aptitudes, and the acquired knowledge and training required; the tools, machines, instruments, and other equipment used; and the basic materials used.[92]

Office Occupations--Those activities-performed by individuals in public and/or private enterprises-which are related to the facilitating function of the office. They include such items as recording and retrieval of data, supervision and coordination of office activities, communication, and reporting of information regardless of the social, economic or governmental organization in which they are found. "The Dictionary of Occupational Titles" provides a source of information concerning the nature of office occupations.

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[91] Ibid, p. 676.

[92] Ibid, p. 676.

Out-of-School Youth--Persons under 21 years of age, excluding children below school age, who (a) are not full-time elementary or secondary school pupils, or under the provisions of compulsory attendance and (b) are not taking courses for college credit toward degrees or equivalent certificates. A pupil is not considered to be an out-of-school youth when he is not attending school during a vacation period.[93]

Post-Secondary Instructional Level--The general level of instruction provided for pupils in college programs, usually beginning with grade 13, and any instruction of a comparable nature and difficulty provided for adults and out-of-school youth.[94]

Private Vocational School--A school established and operated by an agency other than the state or its subdivisions, and supported by other than public funds, which has as its purpose the preparation of students for entrance into or progress in trades or other skilled occupations.

Reimbursable Vocational Program--A class or curriculum--offered through a public school, teacher-training institution or under contract--which is organized and conducted in accordance with the provisions of the state plan for vocational education approved by the U. S. Office of Education. Such programs are eligible to receive funds from the state (from state and federal vocational education appropriations) to cover in part certain costs already incurred. Whether or not aid actually is received is immaterial.

Residential School--An educational institution in which pupils are boarded and lodged as well as taught.[95]

Retraining Programs--Courses which provide an occupational changing type of instruction serving to prepare persons for entrance into a new occupation or to instruct workers in new, different skills demanded by technological changes.

Short-Unit Course--A self-contained training program of relatively short duration for the purpose of giving instruction in a single phase of a subject or in the operation of a specific machine.

Skilled Mechanic--One competent to perform, with a high degree of expertness, the work in one or more specialized divisions of a given trade.

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[93] Ibid, p. 677.

[94] Ibid, p. 679.

[95] Ibid, p. 682.

Skilled Operator--One competent to perform efficiently and expertly one or more kinds of repetitive production or single purpose jobs on machines or other special equipment demanding manual dexterity.

Skills--Abilities acquired by observation, study, or experience in mental and/or physical performance (e.g., proficiency in planning and investigating, operational techniques, comprehension, organization, execution, remembrance, and application of knowledge to acquire a desired result) basic to the mastery of school work or other activity.[96]

State Board for Vocational Education--The agency, created by a state, having major responsibility for the administration and general supervision of vocational education in that state. It is responsible for maintaining certain minimum standards in the expenditure of federal funds allotted to the state for vocational education.

Technical Education--Education to earn a living in an occupation in which success is dependent largely upon technical information and understanding of the laws of science and principles of technology as applied to modern design, production, distribution, and service.

Technical Institute--A school at the post-high school level which offers technical education in one or more fields to prepare people for employment in positions which lie between the skilled workers and professional scientists or engineers.

Technician (Industrial)--A worker on a level between the skilled tradesman and the professional scientist or engineer. His technical knowledge permits him to assume some duties formerly assigned to the graduate engineer or scientist. For example, technicians may design a mechanism, compute the cost, write the specifications, organize the production, and test the finished product. There are technicians in other occupational fields.

Technology--The application of scientific principles in research, design, development, production, distribution, or service. It often is used to denote a segment of the applied sciences, i.e., electronic technology.

Trade and Industrial Education--Instruction which is planned to develop basic manipulative skills, safety judgment, technical knowledge, and related occupational information for the purpose of fitting persons for initial employment in industrial occupations and upgrading or retraining workers employed in industry.

Upgrading or Updating Training--Supplemental or extension training for the purpose of advancement or improving a worker's efficiency.

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[96] Ibid, p. 684.

Vocational Education--"Vocational or technical training or retraining which is given in schools or classes (including field or laboratory work incidental thereto) under public supervision and control or under contract with a state board or local educational agency, and is conducted as part of a program designed to fit individuals for gainful employment as semi-skilled or skilled workers or technicians in recognized occupations (including any program designed to fit individuals for gainful employment in business and office occupations, and any program designed to fit individuals for gainful employment which may be assisted by federal funds under the Vocational Education Act of 1946 and supplementary vocational education Acts, but excluding any program to fit individuals for employment in occupations which the Commissioner determines, and specifies in regulations, to be generally considered professional or as requiring a baccalaureate or higher degree). Such term includes vocational guidance and counseling in connection with such training, instruction related to the occupation for which the student is being trained or necessary for him to benefit from such training, the training of persons engaged as, or preparing to become, vocational education teachers, teacher-trainers, supervisors, and directors for such training, travel of students and vocational education personnel, and the acquisition and maintenance and repair of instructional supplies, teaching aids and equipment, but does not include the construction or initial equipment of buildings or the acquisition or rental of land."*

Vocational Education Act of 1963--Enacted "to authorize federal grants to states to assist them to maintain, extend, and improve existing programs of vocational education, to develop new programs of vocational education, and to provide part-time employment for youths who need the earnings from such employment to continue their vocational training on a full-time basis, so that persons of all ages in all communities of the states--those in high school, those who have completed or discontinued their formal education and are preparing to enter the labor market, those who have already entered the labor market but need to upgrade their skills or learn new ones, and those with special educational handicaps--will have ready access to vocational training or retraining which is of high quality, which is realistic in the light of actual or anticipated opportunities for gainful employment, and which is suited to their needs, interests, and ability to benefit from such training."*

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* As defined in Public Law 88-210.